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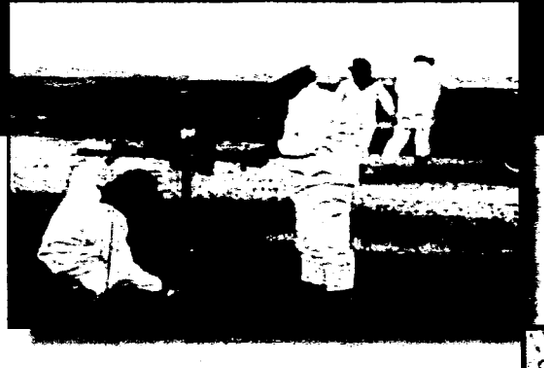

## Final

# Monthly Landfill Gas Monitoring Report For May 2006 Post-Removal Action

## Parcel E-2, Industrial Landfill
## Hunters Point Shipyard
## San Francisco, California

## Contract No. N68711-02-D-8213
## Delivery Order CTO 0013
## Document Control No. 02.125.15.0083

*Prepared by:*

ITSI Innovative Technical Solutions, Inc.

*August 14, 2006*

Contract Number N68711-02-D-8213
ITSI Task Order CTO-0013

Final

# MONTHLY LANDFILL GAS MONITORING REPORT FOR MAY 2006 POST-REMOVAL ACTION

## Parcel E-2, Industrial Landfill
## Hunters Point Shipyard, San Francisco, California

August 14, 2006

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## ACRONYMS and ABBREVIATIONS

| | |
|---|---|
| § | Section |
| 27 CCR | Title 27 of the California Code of Regulations |
| BAAQMD | Bay Area Air Quality Management District |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| cfm | cubic feet per minute |
| CIWMB | California Integrated Waste Management Board |
| GMP | gas monitoring probe |
| HPS | Hunters Point Shipyard |
| IR-01/21 | Installation Restoration Site 01/21 |
| ITSI | Innovative Technical Solutions, Inc. |
| KW | kilowatt |
| LEL | lower explosive limit |
| MCP | Monitoring and Control Plan |
| msl | mean sea level |
| Navy | U.S. Department of the Navy |
| NMOC | non-methane organic compound |
| PID | photoionization detector |
| ppmv | parts per million by volume |
| PV | passive vent |
| TCRA | time-critical removal action |
| Tetra Tech | Tetra Tech EM Inc. |
| UCSF | University of California, San Francisco |

# 1 INTRODUCTION

Innovative Technical Solutions, Inc. (ITSI) received Task Order CTO-0013 from the U.S. Department of the Navy (Navy), Base Realignment and Closure Program Management Office West, under Contract Number N68711-02-D-8213, to provide technical support at Hunters Point Shipyard (HPS) in San Francisco, California. Under CTO-0013, ITSI is monitoring and controlling migration of landfill gas at the Industrial Landfill in Installation Restoration Site 01/21 (IR-01/21) within Parcel E-2 at HPS (Figure 1). All monitoring is being conducted using the requirements of Title 27 of the California Code of Regulations (27 CCR), Section (§) 20921(a)(2) as guidance. This report contains the results of landfill gas monitoring conducted in May 2006.

Recent investigations at the landfill, the purpose and scope of the monthly monitoring investigation, and the organization of this report are discussed below. Additional information about the site background prior to 2002 is presented in the Final Monthly Landfill Gas Monitoring Report for January 2004 submitted by Tetra Tech EM Inc. (2004a).

## *1.1 RECENT INVESTIGATIONS AT THE LANDFILL*

In 2002, the Navy conducted an evaluation to characterize and delineate landfill gas at the Industrial Landfill as part of the nonstandard data gaps investigation at Parcel E (Tetra Tech EM Inc., 2003). Field personnel surveyed ambient air and soil gas and installed gas monitoring probes (GMPs) that were monitored on a weekly and quarterly basis. Figure 2 shows the locations, including GMPs, extraction wells, and passive vents (PVs), where landfill gas was monitored. The results of monitoring indicated that methane, the main component of landfill gas, was present at levels above the lower explosive limit (LEL; 5 percent by volume in air) at the following locations:

- Subsurface areas in the northern portion of the landfill;
- Above ground in ambient air at four areas within the University of California, San Francisco (UCSF) property (herein referred to as "the UCSF compound").

Additionally, trace amounts of methane and non-methane organic compounds (NMOCs) were detected in the crawlspace of Building 830 on the UCSF compound. The concentrations of NMOCs detected were well below action levels, and did not pose a threat to human health (Tetra Tech EM Inc., 2003). Methane was not detected at GMPs along Crisp Avenue, indicating that landfill gas had not migrated northward beyond the UCSF compound to Crisp Avenue or non-Navy property.

From summer 2002 through May 2003, the Navy conducted a time-critical removal action (TCRA) to address the levels of methane above the LEL on the UCSF compound. The goals of the TCRA were (1) to reduce levels of methane within the UCSF compound to below the LEL of 5 percent, in accordance with the requirements at 27 CCR §20921(a)(2), and (2) to prevent future migration of landfill gas to the UCSF compound. A landfill gas control system, which may be operated passively or actively, was installed to achieve the goals of

the TCRA. The Draft Landfill Gas Time-Critical Removal Action Closeout Report (Tetra Tech EM Inc., 2004b) describes these activities in more detail.

From May through November 2003, the Navy continued monitoring at the PVs (PV-01 through PV-04; PV-05 was installed after November 2003) and GMPs (GMP01A through GMP12, GMP20, and GMP21) along the fence immediately north of the landfill. The draft TCRA closeout report contains a detailed summary of monitoring results, potential migration pathways for landfill gas, and the response actions taken to address the gas migration scenarios, including installation of a grout curtain in selected areas (Tetra Tech EM Inc., 2004b). On November 4, 2003, landfill gas monitoring and control activities were suspended; these activities were resumed on January 21, 2004, when a contract for continued activities was implemented. In September 2004, the Navy revised the Parcel E boundary, and the Industrial Landfill area was given the designation "Parcel E-2" (current parcel boundaries are shown on Figure 1).

In January 2005, the Navy transferred Parcel A to the City of San Francisco. The monthly report text and figures now designate this area as "Non-Navy Property."

## 1.2 PURPOSE AND SCOPE

This monthly monitoring report presents and summarizes the evaluation of monitoring data that were collected in May 2006. This report was prepared using the requirements of 27 CCR §20934 as guidance. Specifically, this report provides the following:

- Concentrations of methane measured at each GMP and within each on-site structure.
- Concentrations of other gases (specifically oxygen, carbon dioxide, and non-methane organic compounds) measured at each GMP and within each on-site structure.
- Documentation of the dates and times of monitoring activities, and the barometric pressures, atmospheric temperatures, general weather conditions, probe pressures, and water levels measured or recorded.
- Names of sampling personnel, apparati used, and a brief description of the methods employed.
- A numbering system that correlates monitoring results with the corresponding GMPs and other locations monitored.

Documentation of the dates, extraction locations, periods of operation, and any maintenance issues related to operation of the landfill gas control system.

## 1.3 REPORT ORGANIZATION

This report is organized as follows:

- Section 1 provides an introduction to and an overview of the recent investigations that have occurred at the landfill.

- Section 2 presents the overall objectives and methodologies of the monitoring program.
- Section 3 presents the results of the May 2006 monthly monitoring for landfill gas.
- Section 4 presents an evaluation of these results.
- Section 5 is an overall summary of the monitoring report and current system status.
- Section 6 lists the documents used to prepare this report.

Tables and figures follow Section 6. The following appendices also are included with this report, following the figures:

- Appendix A presents landfill gas monitoring data and depth-to-water data (as recorded on the Landfill Gas Monitoring Log and Water Level Monitoring Log).
- Appendix B provides a summary of other monitoring results for the current reporting period.

# 2 MONITORING PROGRAM OBJECTIVES AND METHODOLOGIES

This section discusses the objectives and methodologies of the landfill gas monitoring program at HPS Parcel E-2.

## *2.1 OBJECTIVES*

The objective of monitoring landfill gas is to verify that the landfill gas control system at Parcel E-2 is effectively reducing levels of methane to below the LEL and preventing hazardous levels of landfill gas from migrating to the UCSF compound and non-Navy property. Title 27 CCR provides standards for monitoring and controlling combustible gases such as methane. Bay Area Air Quality Management District (BAAQMD) Regulation 8, Rule 34, addresses control of NMOC emissions from solid waste disposal sites.

The landfill gas monitoring and control requirements of 27 CCR and BAAQMD Rule 34 apply to landfills operating under state Resource Conservation and Recovery Act (RCRA) permits. These requirements can be applied to older, inactive, or closed landfills if they pose a potential threat to public health and safety or the environment. The applicability or relevance and appropriateness of 27 CCR requirements to the industrial landfill at IR-01/21 will be evaluated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. BAAQMD Rule 34 does not regulate the landfill in Parcel E-2. However, both the 27 CCR and Rule 34 requirements were used as guidelines for development and implementation of the Final Interim Landfill Gas Monitoring and Control Plan (MCP) (Tetra Tech EM Inc., 2004c), pending completion of the final CERCLA remedy for the landfill.

Title 27 CCR §20921 sets forth the following three performance standards for control of landfill gases at closed landfills:

1. Concentrations of methane gas must not exceed 1.25 percent by volume in air (25 percent of the LEL) within on-site structures.
2. The concentration of methane gas migrating from the landfill must not exceed 5 percent by volume in air at the property boundary or an alternative boundary approved in accordance with §20925.
3. Trace gases (NMOCs) must be controlled to prevent adverse acute and chronic exposure to toxic or carcinogenic compounds.

The criteria for the first two requirements are clear, but the third requirement does not identify specific field monitoring limits for trace gas concentrations. As a result, action levels for field monitoring of NMOCs were established based on an evaluation of previous risk assessments and Tetra Tech EM Inc. health and safety criteria (Tetra Tech EM Inc., 2002). Tetra Tech EM Inc.'s health and safety criterion limits NMOCs in the breathing zone to 5 parts per million by volume (ppmv). This criterion will be applied to on-site structures and utilities that are accessible to workers, and to surface locations on the UCSF compound where landfill gas has been historically detected. These locations include the crawlspace under Building 830 and the surface locations shown on Figure 2.

Previous risk assessments described in the MCP show that subsurface trace gases found in GMPs within the UCSF compound and along Crisp Avenue do not pose an unacceptable health risk (Tetra Tech EM Inc., 2004c). An action level of 500 ppmv was established for NMOCs in GMPs. Historic monitoring results for NMOCs have been below 50 ppmv, an order of magnitude below this action level.

The 5 percent limit for methane at the property boundary (requirement 2 above) does not apply to either passive vents or to monitoring wells located on the landfill. Passive vents are part of the landfill gas migration control system, and frequently exceed 5 percent methane by design. The 5 percent limit does apply at the GMPs, which are located at various distances outside a Gundwall barrier that reduces the outward migration of landfill gases from the trench and passive vents.

The requirements for monitoring and reporting landfill gas, as set forth in 27 CCR, may be summarized as follows:

- Perimeter Monitoring Network (§20925): Gas monitoring probes will be located near the site property boundary with lateral spacing of no more than 1,000 feet and at depths above groundwater and bedrock.
- Structural Monitoring (§20931): The design of the monitoring network will encompass on-site structures, including buildings, basements, manholes, pipelines, and utility vaults. Methods for on-site structural monitoring may include periodic monitoring using either permanently installed probes or gas surveys, or continuous monitoring systems.
- Monitoring Parameters (§20932): All gas monitoring probes and on-site structures will be monitored for methane, and for trace NMOCs if required.

- Monitoring Frequency (§20933): At a minimum, quarterly monitoring is required. More frequent monitoring may be required at locations where monitoring results indicate that landfill gas is migrating or is accumulating in structures.
- Reporting (§20934): Results of landfill gas monitoring will be submitted to the California Integrated Waste Management Board within 90 days, provided compliance levels are maintained. When compliance levels are exceeded, the results must be submitted within 5 days. A letter that describes the nature and extent of the problem and any immediate corrective actions that must be taken to protect public health and safety and the environment will be submitted within 10 days.

Portions of the landfill gas control system, and some of the current monitoring points, are on property the Navy has transferred to UCSF. Negotiations are under way between the Navy and UCSF regarding the property that contains the landfill gas control system.

## 2.2 MONITORING METHODOLOGIES

Each month, landfill gas is monitored to evaluate migration from the landfill to verify that the landfill gas control system is achieving the regulatory requirements set forth in 27 CCR §20921 and BAAQMD Rule 34. This section briefly discusses the procedures used to monitor landfill gas. The MCP (Tetra Tech EM Inc., 2004c) provides a more detailed discussion of monitoring procedures.

A CES-Landtec GEM 2000 landfill gas meter was used to monitor concentrations of methane, oxygen, and carbon dioxide, the percentage of the methane LEL, and real-time temperature and barometric pressure. A calibrated Mini-RAE Plus Classic photoionization detector (PID) with a 10.6 electron-volt lamp was used to monitor NMOCs. A Gilian GilAir air-sampling pump was used to purge the GMPs prior to monitoring. Pressure in the GMPs was measured using a Magnehelic pressure gauge.

Before soil gas readings were recorded, pressure was measured at the GMPs using a Magnehelic pressure gauge with a scale of 0 to 10 inches of water. The air pump was then connected to the sampling port of the GMP and used to purge air from the GMP for at least one minute at 3,000 cubic centimeters per minute. After the GMP was purged, the GEM 2000 landfill gas meter was connected to the sampling port. Readings were recorded when concentrations of landfill gas were stable for at least 30 seconds. Background levels of NMOCs were recorded from the PID by recording the ambient air reading before the meter was connected to the sampling port. After background levels of NMOCs were recorded, the PID was connected to the sampling port to measure NMOCs. Concentrations of NMOCs were recorded when the PID indicated a stable value for at least 30 seconds.

Table 1 identifies the sampling personnel and the equipment used during monitoring. Table 2 lists the monitoring locations by category.

### 2.2.1 Active Gas Extraction Schedule

From January 27, 2004, to August 28, 2004, gas extraction along the landfill gas barrier wall (see Figure 2) was performed semi-continuously (i.e., except for brief shutdowns for maintenance) at PV-02 and PV-03, and occasionally at GMP24 as needed. The active gas extraction system was inoperable from August 28, 2004, to September 29, 2004, due to a power outage at the electrical service drop (see Section 2.4). During this time, the system was passively venting from PV-01, PV-02, PV-04, and PV-05. PV-03 was not vented during this time.

Active gas extraction was resumed at PV-02 on September 29, 2004, and continued until October 7, 2004, along with extraction at GMP24 from September 30, 2004, to October 4, 2004 (ITSI 2005a, 2005b). In the months of October 2004 through February 2005, active extraction was performed continuously at PV-02 for one full week just prior to the monthly gas monitoring event.

Because of concerns that an extraction schedule limited to one week per month might allow landfill gas to migrate off the site during the rest of the month, when extraction was not occurring, the active gas extraction schedule was changed in March 2005. The revised protocol called for active gas extraction to be performed for 40 consecutive hours each week.

Beginning in May 2005, monthly gas monitoring events were performed following a period of several days during which there had been only passive extraction and just before the active extraction system was activated, so that the data collected represented the presumed worst-case conditions of the extraction schedule. This practice has been suspended temporarily due to the continuous (24-hour/7-day) active extraction schedule adopted on February 8, 2006 (see discussion below).

Beginning in October 2005, passive vents PV-01, PV-03, PV-04, and PV-05 were closed off during any active extraction at PV-02, to maximize the efficiency of methane extraction from the interception trench. These vents were re-opened when active extraction was concluded. This practice was discontinued in December 2005 because of concerns that closing the vents may put undue vacuum pressure on the interception trench. The vents are now left open at all times.

Beginning on February 8, 2006, active gas extraction at PV-02 was initiated on a 24-hours-a-day, 7-days-a-week schedule in order to control methane levels in the interception trench and in fence line GMPs more effectively. This schedule was adopted when it was determined that the 40-hours-per-week active extraction schedule was no longer sufficient to control methane migration to the fence line GMPs (particularly GMP-01A and GMP-07A).

During the month of May 2006, active gas extraction was conducted at PV-02 as follows:

| System On | System Off | Hours Run | Notes |
|---|---|---|---|
| 2/8/06, 1430 | NA | 744.0 | Active extraction ongoing through May |
| Total May Operating Hours: | | 744.0 | |

## 2.3 DATA EVALUATION

Results of landfill gas monitoring for May 2006 were evaluated against the data quality objectives for methane and NMOCs outlined in the MCP (Tetra Tech EM Inc., 2004c) based on the performance standards set forth in 27 CCR and BAAQMD Rule 34. Section 3 summarizes the results of landfill gas monitoring in May 2006.

## 2.4 DEVIATIONS

Following the damage to the electrical service drop which left the landfill gas control system without power from August 28, 2004, through September 28, 2004, temporary power was supplied by a portable generator until the permanent power source for the active control system was restored on March 27, 2006, as noted in Section 3.1.5 below.

All of the extraction well and electrical vaults that had been monitored as on-site structures were excavated and removed by TetraTech EC, Inc., construction crews between September 2005 and January 2006, and therefore could not be monitored during the May 2006 event. It is not yet known if these structures are to be replaced.

At some point after ITSI conducted the April 2006 monitoring, well IR74MW01A was damaged by construction crews working on the non-Navy property along and north of Crisp Avenue formerly known as HPS Parcel A; therefore it was not possible to measure the static water level at this well during the May monitoring event. Landfill gas is not monitored at IR74MW01A.

# 3 MONITORING RESULTS

This section presents the results for monthly monitoring at the landfill during May 2006, based on monitoring measurements and depth-to-water readings recorded on May 22, 2006. Section 3.1.5 discusses operation and maintenance of the landfill gas control system. Appendix A contains the Landfill Gas Monitoring Log and the Water Level Monitoring Log for the May 2006 monitoring event. Appendix B summarizes the results of landfill gas monitoring at locations other than those specified in the MCP (Tetra Tech EM Inc., 2004c). These locations, specifically the groundwater monitoring wells on the landfill cap, are being monitored monthly to further evaluate the relative rate of gas generation in the landfill.

## 3.1 METHANE RESULTS

This section summarizes the results of methane monitoring for the May 2006 monitoring event. Figure 2 shows the locations that were monitored; the May 2006 results for methane (excluding passive vents and the wells listed in Appendix B) are shown on Figure 3 and Figure 4. Table 3 presents the methane results for each MCP-specified monitoring location. Note that all methane concentrations are provided in percentage of methane by volume.

The subsections below present the results for monitoring locations in the following areas:

- the fence line between the landfill and the UCSF compound,
- the UCSF compound,
- Crisp Avenue, beyond (north of) the UCSF compound,
- ambient air and structure locations, and
- the landfill gas control system.

The fence line between the landfill and the UCSF compound is considered the property boundary for the landfill gas monitoring program (Tetra Tech EM Inc., 2004c), which is of significance for reporting the monitoring results consistent with Title 27 CCR §20921 (see section 2.1 above).

### 3.1.1 Fence Line

Concentrations of methane in the GMPs along the fence line north of the landfill (GMP01A through GMP12, GMP20, and GMP21) are representative of concentrations of methane migrating from the site boundary. During the May 2006 monitoring event, methane was detected in one fence line GMP (GMP08A at 0.2% by volume). The regulatory performance standard of less than 5 percent (%) methane by volume and the HPS site action level of 2.5% was met at all fence line GMPs. Therefore, no extraction or follow-up monitoring was necessary. Figure 3 and Table 3 show the results for methane at GMPs along the fence line between Parcel E-2 and the UCSF compound.

### 3.1.2 UCSF Compound

During the May 2006 monitoring event, methane was detected in one of the UCSF compound GMPs (GMP24 at 1.9% by volume). Methane was not detected at any other UCSF location. As these data demonstrate that the regulatory performance standard of less than 5% and the HPS action level of 2.5% were met for all locations at the UCSF compound, no extraction or follow-up monitoring were necessary. Figure 3 and Table 3 show the methane monitoring results for GMPs within the UCSF compound.

### 3.1.3 Crisp Avenue

On May 22, 2006, methane was not detected in any of the GMPs along Crisp Avenue (GMP13 through GMP19 and GMP27 through GMP32), thereby meeting both the regulatory performance standard of 5% and the HPS site action level of 2.5%. Figure 3 and Table 3 show the methane monitoring results for these GMPs.

### 3.1.4 Ambient Air and Structural Locations

On May 22, 2006, methane was monitored at the ambient air and structural locations. These locations include the light pole, the ground surface along the fence (location A), the basketball court (location B), and the crawlspace at Building 830, all within the UCSF compound; and the remaining on-site utilities locations (i.e., catch basins DP1 and DP2). Methane was not detected in any of the on-site utilities, at ambient air locations, or in the crawlspace at Building 830 in May 2006, thereby meeting both the regulatory performance standard of 5% and the HPS site action level of 2.5%. (The crawlspace at Building 830 is being monitored by the Navy because of its close proximity to the landfill.) Figure 4 and Table 3 show the methane monitoring results for these locations.

### 3.1.5 Control System

On May 22, 2006, concentrations of methane at the landfill gas control system (passive vents PV-01 through PV-05) ranged from a high of 47.5% by volume at the PV-05 influent to 0.0 percent by volume at PV-03. Table 3 presents the results for methane from monitoring locations at the landfill gas control system. As Figure 19 of the MCP specifies that temperatures at the control system vents be less than 55 °C (113 °F), these temperatures also are monitored during monthly monitoring events, and the readings are documented in Appendix A. The 55 °C limit has not been exceeded since monitoring began.

As documented in the August and September 2004 monthly reports (ITSI 2005c, 2005a), the landfill gas control system was without power from August 28, 2004, through September 28, 2004, due to damage to the electrical service drop caused by workers at the Golden Gate Railroad Museum yard (see Section 2.2.1). A mobile generator was brought on site on September 29, 2004, and was employed as the power source for active extraction until PG&E power was restored in March 2006.

In June 2005, PG&E approved a revised power installation plan to provide temporary power for three years. The plan included installing two power poles, coordinating a power drop and meter installation with PG&E, terminating unused conduits, and removing an existing power pole that was no longer needed. Following Navy approval of the cost proposal for the performance of this work in December 2005, and PG&E approval of the final plan for the installation work in February 2006, the new power poles were installed on February 28, 2006. PG&E made the power connections on March 24, 2006, and power was restored to the active extraction system on March 27, 2006.

## 3.2 TRACE GAS RESULTS

During the May 2006 event, NMOCs were well below action levels at all monitoring locations. (Action levels are: 500 ppmv at GMPs, 5 ppmv within Building 830, 5 ppmv in on-site utilities, 5 ppmv in ambient air [recorded in the breathing zone], and 100 ppmv for two consecutive days from the outlet [effluent] of the control system.) Table 4 presents the monitoring results for NMOCs during May 2006. Figures 10 and 11 show the historical results for NMOCs at GMPs at the fence line and on the UCSF compound for each monitoring event from June 2005 through May 2006.

Due to a previous problem with the PID pump, (as described in Section 3.2 of the March 2006 Monthly Report [ITSI, 2006]) a pre-monitoring field check of the PID vacuum pressure was performed along with the regular field calibration to verify that the instrument pump was functioning properly. It was determined that the PID was creating sufficient vacuum to generate correct//accurate readings.

NMOCs were detected in two of the UCSF compound GMPs (GMP23 at 4.1 ppmv, and GMP24 at 6.2 ppmv). As these concentrations were well below the NMOC action level for GMPs (500 ppmv), no action or follow-up monitoring was necessary. NMOCs were monitored at three locations at each of the PVs: at the influent, after the first carbon canister, and at the effluent (or Hydrosil) canister. NMOCs were detected at PV-01 at levels up to 7.4 ppmv at the influent; at PV-02 at levels up to 13.2 ppmv at the first carbon canister; and at PV-05 at levels up to 1.9 ppmv at the influent (see Table 4 for all results). NMOC concentrations at all PV effluent locations were at background levels (0.1 ppmv), well below the 100-ppmv action level for the outlet (effluent) of the control system. NMOCs were not detected above background in any of the ambient air or structural monitoring locations during the May 2006 monitoring event.

Oxygen concentrations in all GMPs on the UCSF compound and most of the GMPs along the fence line were significantly below the standard atmospheric concentration of 20.9 percent. Table 5 presents the monitoring results for oxygen during the May 2006 monitoring event. Oxygen values in these areas ranged from 0.2 percent by volume (at GMP25) to 17.4 percent (at GMP26) in the UCSF compound GMPs, and from 0.3 percent (at GMP08A) to 21.3 percent (at GMP21) along the fence line. Eleven of the 14 fence line GMPs had less than 18.5 percent oxygen. Concentrations of oxygen reported in the other monitoring areas were closer to the standard atmospheric concentration. Oxygen concentrations at GMPs along Crisp Avenue were between 16.7 and 20.6 percent by volume. Oxygen is not regulated under 27 CCR or BAAQMD Rule 34, but low concentrations of oxygen in soil may be associated with landfill gas.

Carbon dioxide concentrations in the GMPs closest to the landfill (i.e., those along the fence line and on the UCSF compound) ranged from 0.0 to 15.2 percent by volume (Table 6), significantly above the standard atmospheric concentration of approximately 0.04 percent (400 ppmv). Carbon dioxide levels in the GMPs along Crisp Avenue, farther from the landfill, generally were lower, ranging from 0.1 to 1.4 percent by volume. Carbon dioxide is not regulated under 27 CCR or BAAQMD Rule 34, but carbon dioxide concentrations frequently are elevated where landfill gas is present.

## 3.3 PROBE PRESSURE

Measurement of air pressure at the GMPs helps assess whether landfill gas is accumulating, and can provide information about the influence of the extraction system on reducing any increases in the generation of landfill gas. On May 22, 2006, gauge pressure at the GMPs (pressure in the probes relative to atmospheric pressure) was measured using a Magnehelic pressure gauge. Table 7 presents the probe pressure readings recorded at GMPs during this monitoring event. No probe pressure was detected in any of the GMPs during the May 2006 event.

## 3.4 WATER LEVEL RESULTS

Water level measurements are recorded to confirm that the bottom of the landfill gas barrier wall is below the top of the saturated zone, and is preventing landfill gas from migrating underneath the barrier wall. Water level measurements also provide information about the thickness of the vadose zone, as the lower boundary of the vadose zone is determined by the elevation of the water table.

On May 22, 2006, water levels were measured at the GMPs along Crisp Avenue (GMP27 through GMP32) and at 10 additional groundwater monitoring wells and piezometers. As noted above, well IR74MW01A has been damaged by construction crews working on the former Parcel A, and could not be measured for water level. Water levels were measured as depths below the tops of well casings. Subsequently, these measurements were converted to depths below ground surface and to elevations relative to mean sea level (msl) using surveyed elevations. Table 8 shows the measured water levels and the converted values. Water levels also are shown on tables 3 through 6 for comparison with GMP screened intervals.

Figure 5 shows the groundwater potentiometric surface of the A-aquifer (shallow groundwater zone) on May 22, 2006, and the elevations of the bottom of the landfill gas barrier wall at these locations. Groundwater generally flows to the east and southeast from the non-Navy property north of Parcel E-2 toward San Francisco Bay and to a groundwater sink near the northern end of the boundary between Parcels D and E (east of the monitored area shown on Figure 5). The water level readings for May 22, 2006, indicate that the bottom of the barrier wall, which ranges in elevation from –1.2 feet above msl (i.e., 1.2 feet below msl) to 1.9 feet above msl, was submerged below the water table at all locations monitored.

As discussed in greater detail in Section 4, there appears to be an inverse relationship between methane concentrations and groundwater elevations at GMP24 (which generally is the GMP with the highest methane concentrations). In general, the lower the groundwater elevation near GMP24, the higher the methane concentration at GMP24. Figure 12 illustrates this relationship. The opposite relationship appears to exist for methane

concentrations and groundwater elevations near GMP01A and GMP07A, where detected concentrations of methane have been reported only in the wet season (see Figure 13).

## 3.5 METEOROLOGICAL DATA

Meteorological data are used qualitatively to evaluate whether changes in weather affect the behavior of landfill gas. For example, a rapid decrease in barometric pressure may affect the amount of landfill gas that is released, and temperature may affect the rate of landfill gas generation. In addition, precipitation and the elevation of the water table influence the volume of the vadose zone, and may influence the potential buildup of pressure behind submerged probe screens.

Meteorological data are collected from an on-site station located southeast of the landfill cap at an elevation of about 25 feet above msl (see Figure 2). The location of the meteorological station is considered representative of the HPS area because data collection is not limited by proximity to complex terrain or large structures and because the station is located on flat terrain. Sensors on the meteorological tower record wind speed, wind direction, air temperature, relative humidity, precipitation, dew point, and barometric pressure. Sensor readings of all parameters are recorded at one-second intervals, averaged, and stored as 15- and 60-minute averages in the data logger. Weekly data reports are available on the Navy's public Web site at:
http://www.efdsw.navfac.navy.mil/06/HPS_E/Landfill_Gas/index.htm#meteorological_data.

Table 9 presents daily meteorological data collected during May 2006. Daily meteorological data are averages of hourly data, except for daily precipitation, which is the sum of hourly precipitation data, and cumulative precipitation, which is the season-to-date total at the end of each day.

Table 10 summarizes monthly meteorological data for May 2005 through May 2006. Monthly meteorological data are averages of hourly data, except for monthly precipitation, which is the sum of daily precipitation data, and cumulative precipitation, which is the season to-date total at the end of each month.

Concentrations of methane may be affected by atmospheric variations, although other factors (e.g., groundwater elevation, changes in the operation of the extraction system) may overshadow any effects caused by atmospheric variations. Figures 6 and 7 show the daily barometric pressures and observed methane concentrations for each day that methane was monitored at GMPs at the fence line and on the UCSF compound. Similarly, figures 8 and 9 show the daily temperatures and the observed methane concentrations at the same GMPs. No correlations between methane readings and meteorological parameters are apparent at this time; however, longer-term (seasonal) effects on methane concentrations at GMPs appear to determine methane occurrence, as further discussed in Section 4.

# 4 EVALUATION OF RESULTS

The primary objective of monthly monitoring of landfill gases is to verify that the landfill gas control system is effective in preventing migration of landfill gas to the UCSF compound and adjacent non-Navy property. Monitoring locations include the GMPs, ambient air locations, the crawlspace at Building 830, the on-site utilities, and the landfill gas control system. From May 2005 through January 2006, when active extraction occurred for only 40 hours a week, monthly gas monitoring events were performed when the active gas extraction system was not operating. However, as long as active extraction is continuous, monthly gas monitoring events (beginning with the February 2006 event) will be performed while extraction is ongoing.

During the May 2006 monitoring event, methane was well below action levels at all monitoring locations. Aside from the control system and the wells located on the landfill cap, methane was detected in two locations: GMP08A, at 0.2% by volume, and GMP24, at 1.9% by volume. These concentrations of methane are well below the HPS action level for methane in GMPs (2.5% by volume) and the regulatory limit for methane in GMPs (5% by volume); therefore, no response action or follow-up monitoring was necessary.

During the May 2006 monitoring event, NMOCs were well below action levels at all monitoring locations. NMOCs were detected above background concentrations at two locations (GMP23 and GMP24 in the UCSF compound) that frequently have had detections during monthly monitoring, and in the gas extraction trench at PV-01, PV-02, and PV-05. Significantly, the fence-line GMPs adjacent to the extraction trench showed no NMOC detections, suggesting that active extraction may be preventing off-site migration of NMOCs. NMOC detections at the UCSF GMPs have been noted before; the May 2006 detections (up to 6.2 ppmv) are significantly lower than the peak concentrations noted in the winter of 2005 (up to 25.2 ppmv). Since February 2005, NMOC concentrations at the UCSF GMPs have remained below 10 ppmv.

Since regular monitoring was initiated in January 2004, methane concentrations at GMP24 have exceeded 2.5 percent by volume on five occasions (May, July, and September of 2004, and August and October of 2005), requiring activation of the active gas extraction system. All five occasions are in the drier half of the year, and this pattern may reflect seasonal influences on gas migration. Methane concentrations at GMP23 have followed a similar seasonal pattern, with methane peaks roughly coinciding with troughs in groundwater elevations during the dry season (see Figure 12). One possible explanation for the elevated dry-season detections of methane is that lower groundwater levels, which result in a thicker and less constricted vadose zone, permit greater gas flow in the subsurface in this area. Data for the system monitoring events is reviewed on an ongoing basis to identify possible seasonal and other influences on gas migration. As methane in GMP24 is on the rise once again with the onset of the 2006 dry season, this seasonal pattern appears to be continuing.

In contrast to the dry-season peaks at GMP24, the methane detections to date at the fence line at GMP01A and GMP07A have been limited to the wet season (December through

May; see Figure 13). No detections have occurred in the dry seasons. The detections at these two GMPs in January 2006 were much higher than those noted since January 2004. The methane exceedances of the 5% regulatory limit in January and early February 2006 followed a period of high precipitation in December and early January. The high precipitation is reflected in the rapid rise of groundwater elevations near GMP01A and GMP07A, as shown in Figure 13. These observations suggest that conditions specific to the wet season were causative factors.

One of the following mechanisms may account for the winter 2006 methane exceedances at the two fence line GMPs:

(1) Seasonally wet conditions (wet surface soils, surface water accumulations, and high groundwater levels) could block normal migration pathways for soil-gas methane and redirect flow in different directions than at other times of the year. This mechanism could occur on a large scale through submergence of the liner-edge by high seasonal water along the southern landfill margin; methane that would vent to the atmosphere in this area in the summer may be forced to migrate in other directions in the wet season.

(2) Subsurface methane could be forced to move laterally or upward through displacement by water migrating in the subsurface. For example, seasonally rising groundwater combined with downward-infiltrating precipitation decreases the volume of the vadose zone, increasing soil-gas pressure and inducing pressure gradients that in turn could result in lateral gas migration in the subsurface. Note that wet surface soils tend to limit the upward escape of methane to the atmosphere that can more easily occur during the dry season in the uncapped part of the landfill between the cap and the trench (immediately northeast of the capped area).

Since continuous active extraction resumed at PV-02 on February 8, 2006, the presence of methane in the control system passive vents has fluctuated greatly, from a concentration range of 0.0–8.1% in February, March, and April 2006 to a range of 0.0–47.5% in May 2006. Note, however, that methane remained at 0.0% in the fence-line GMPs, indicating that the trench was acting to prevent methane migration beyond the trench. The recent increases in methane at the PVs could be accounted for by a variety of factors. Such factors include (1) higher temperatures and greater sunshine that could increase biological methane-generating activity; (2) lower groundwater levels that could open up different seasonal migration pathways for methane; and (3) lower surface moisture or soil moisture the could open up different seasonal migration pathways.

NMOCs at the passive vents have had different time-concentration patterns than methane in recent months. While methane at the PVs was low in April and high in May, NMOCs show the opposite trend. The specific mechanism controlling these patterns is not clear. However, the specific source location for the NMOCs may not be exactly the same as for the bulk of the methane. A common observation at landfills is that NMOCs are often concentrated in specific, small "hot spots" within the larger landfill. This could account for the differing concentration patterns through time.

# 5 SUMMARY

Monthly landfill gas monitoring and water level measurements took place on May 22, 2006. Title 27 CCR limits concentrations of methane gas to 5 percent by volume at the site boundary and 1.25 percent by volume in on-site structures. During the May 22, 2006, monitoring event, methane was detected in two GMPs (GMP08A at 0.2% by volume and GMP24 at 1.9% by volume), and met the regulatory performance standard of less than 5 percent by volume (the LEL for methane) at all GMPs. Therefore, no follow-up monitoring was necessary. Ongoing extraction at the control system trench continued throughout the month.

The action levels for NMOCs (established based on an evaluation of previous risk assessments and Tetra Tech EM Inc. health and safety criteria [Tetra Tech EM Inc., 2002]) are 500 ppmv in GMPs, 5 ppmv within Building 830, 5 ppmv in on-site utilities, 5 ppmv in ambient air (recorded in the breathing zone), and 100 ppmv for 2 consecutive days from the outlet of the control system. During the May 2006 monitoring event, concentrations of NMOCs at all monitoring locations were well below the corresponding action levels.

# 6 REFERENCES

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ITSI, 2005c. Final Monthly Gas Monitoring Report for August 2004, Post-Removal Action, Parcel E, Industrial Landfill, Hunters Point Shipyard, San Francisco, California. January 31.

ITSI, 2005d. Final Monthly Gas Monitoring Report for January 2005, Post-Removal Action, Parcel E, Industrial Landfill, Hunters Point Shipyard, San Francisco, California. April 22.

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Tetra Tech EM Inc., 2003. Final Parcel E Nonstandard Data Gaps Investigation, Landfill Gas Characterization, Hunters Point Shipyard, San Francisco, California. September 5.

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Tetra Tech EM Inc., 2004b. Draft Landfill Gas Time-Critical Removal Action Closeout Report, Parcel E, Industrial Landfill, Hunters Point Shipyard, San Francisco, California. March 19.

Tetra Tech EM Inc., 2004c. Final Interim Landfill Gas Monitoring and Control Plan, Parcel E, Industrial Landfill, Hunters Point Shipyard, San Francisco, California. August 13.

# TABLES

## TABLE 1: PERSONNEL AND EQUIPMENT

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| **PERSONNEL** | | |
|---|---|---|
| **Name** | **Responsibility** | **Company** |
| Brett Womack | Task Manager | Innovative Technical Solutions, Inc. |
| **EQUIPMENT** | | |
| **Sampling Apparatus** | **Manufacturer/Model** | **Purpose** |
| Landfill Gas Meter | CES-LANDTEC GEM-2000 | Monitor methane, oxygen, carbon dioxide, and lower explosive limit |
| Photoionization Detector (10.6 electron-volt lamp) | Mini-RAE Plus Classic PGM-761S | Monitor non-methane organic compounds |
| Air Sampling Pump | Gilian GilAir-5 | Purge GMPs |
| Pressure Gauge | Magnehelic | Measure pressure in GMPs |

## TABLE 2: LANDFILL GAS MONITORING LOCATIONS

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Monitoring Location | Description |
|---|---|
| Fence Line GMPs | GMP01A, GMP02A, GMP03, GMP04A, GMP05B, GMP06B, GMP07A, GMP08A, GMP09, GMP10, GMP11A, GMP12, GMP20, and GMP21 |
| UCSF Compound GMPs | GMP22 to GMP26 |
| Crisp Avenue GMPs | GMP13 to GMP19 and GMP27 to GMP32 |
| Ambient Air Locations | Light Pole, Ground Surface Along Fence, and Basketball Court |
| Occupied Structure | Building 830 Crawlspace |
| On-Site Utilities [a] | DP1 and DP2 |
| Passive Vents | PV-01, PV-02 *, PV-03, PV-04, and PV-05 |
| Extraction Wells [b] | EX-5, EX-6, EX-7, and EX-8 |
| Groundwater Elevation Locations | GMP27, GMP28, GMP29, GMP30, GMP31, GMP32, IR01MW02B, IR01MW03A, IR01MW05A, IR01MW10A, IR01MW11A, IR01MW12A, IR01P04A, IR01P03AA, IR01P03AB, IR74MW01A **, and IR76MW13A |
| Additional Monitoring Locations | IR01MW16A, IR01MW18A, IR01MW366A, IR01MWI-5 |

Notes:

[a] EW108, EW122, EV122, EW134, EV134, EW138, EV138, EW142, EV142, EW146, EV146, EW150, EV150, EW154, EW158, and EV158 were excavated and removed between September 2005 and January 2006, and are no longer monitored.

[b] Monitoring at extraction wells is required only if the control system is actively extracting from these locations; however, they also may be included as part of response action monitoring.

* Active extraction point

** Well IR74MW01A has been damaged, and therefore was not monitored.

DP discharge point

IR Installation Restoration

GMP gas monitoring probe

PV passive vent

MW monitoring well

UCSF University of California, San Francisco

## TABLE 3: METHANE CONCENTRATIONS, MAY 22, 2006

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Location | Monitoring Location ID Number | Screened Interval (feet bgs) | Depth to Water (feet bgs) | Methane Concentration on May 22, 2006 (percent by volume) |
|---|---|---|---|---|
| Fence Line GMPs | GMP01A | 6.0 to 13.5 | NA | 0.0 |
| | GMP02A | 6.0 to 13.5 | NA | 0.0 |
| | GMP03 | 6.0 to 13.5 | NA | 0.0 |
| | GMP04A | 6.0 to 13.5 | NA | 0.0 |
| | GMP05B | 6.0 to 12.5 | NA | 0.0 |
| | GMP06B | 6.0 to 13.5 | NA | 0.0 |
| | GMP07A | 6.0 to 13.5 | NA | 0.0 |
| | GMP08A | 4.5 to 9.5 | NA | 0.2 |
| | GMP09 | 6.0 to 9.5 | NA | 0.0 |
| | GMP10 | 4.0 to 6.5 | NA | 0.0 |
| | GMP11A | 4.0 to 5.5 | NA | 0.0 |
| | GMP12 | 5.0 to 13.0 | NA | 0.0 |
| | GMP20 | 3.5 to 4.5 | NA | 0.0 |
| | GMP21 | 3.5 to 4.5 | NA | 0.0 |
| UCSF Compound GMPs | GMP22 | 6.0 to 13.5 | NA | 0.0 |
| | GMP23 | 6.0 to 13.5 | NA | 0.0 |
| | GMP24 | 6.0 to 13.0 | NA | 1.9 |
| | GMP25 | 6.5 to 11.5 | NA | 0.0 |
| | GMP26 | 6.5 to 11.5 | NA | 0.0 |
| Crisp Avenue GMPs | GMP13 | 6.0 to 12.0 | NA | 0.0 |
| | GMP14 | 6.0 to 10.0 | NA | 0.0 |
| | GMP15 | 6.0 to 12.0 | NA | 0.0 |
| | GMP16 | 5.0 to 10.0 | NA | 0.0 |
| | GMP17 | 6.0 to 10.0 | NA | 0.0 |
| | GMP18 | 6.0 to 12.0 | NA | 0.0 |
| | GMP19 | 4.5 to 5.5 | NA | 0.0 |
| | GMP27 | 4.7 to 22.2 | 9.48 | 0.0 |
| | GMP28 | 6.2 to 21.2 | 14.37 | 0.0 |
| | GMP29 | 6.2 to 18.7 | 12.53 | 0.0 |
| | GMP30 | 4.5 to 17.0 | 11.28 | 0.0 |
| | GMP31 | 6.0 to 16.0 | 11.15 | 0.0 |
| | GMP32 | 4.75 to 14.75 | 10.74 | 0.0 |

## TABLE 3: METHANE CONCENTRATIONS, MAY 22, 2006 (continued)

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Location | Monitoring Location ID Number | Screened Interval (feet bgs) | Depth to Water (feet bgs) | Methane Concentration on May 22, 2006 (percent by volume) |
|---|---|---|---|---|
| Ambient Air Locations | Light Pole | NA | NA | 0.0 |
| | Ground Surface Along Fence | NA | NA | 0.0 |
| | Basketball Court | NA | NA | 0.0 |
| Occupied Structure | Building 830 Crawlspace | NA | NA | 0.0 |
| On-Site Utilities [a] | DP1 | NA | NA | 0.0 |
| | DP2 | NA | NA | 0.0 |
| Passive Vents [b] | PV-01 Influent | NA | NA | 16.4 |
| | PV-01 Carbon 1 | NA | NA | 26.1 |
| | PV-01 Hydrosil | NA | NA | 0.0 |
| | PV-02 Influent | NA | NA | 0.8 |
| | PV-02 Carbon 1 * | NA | NA | 0.0 |
| | PV-02 Hydrosil * | NA | NA | 0.0 |
| | PV-03 Influent | NA | NA | 0.0 |
| | PV-03 Carbon 1 | NA | NA | 0.0 |
| | PV-03 Hydrosil | NA | NA | 0.0 |
| | PV-04 Influent | NA | NA | 2.2 |
| | PV-04 Carbon 1 | NA | NA | 10.3 |
| | PV-04 Hydrosil | NA | NA | 33.2 |
| | PV-05 Influent | NA | NA | 47.5 |
| | PV-05 Carbon 1 | NA | NA | 47.1 |
| | PV-05 Hydrosil | NA | NA | 0.2 |

**Notes:**

[a] EW108, EW122, EV122, EW134, EV134, EW138, EV138, EW142, EV142, EW146, EV146, EW150, EV150, EW154, EW158, and EV158 were excavated and removed between September 2005 and January 2006, and are no longer monitored.

[b] The regulatory limit of 5% methane does not apply to passive vents, which are part of the remedial system designed to collect and control migration of landfill gas.

* PV-02 Carbon 1 and Hydrosil drums located on active extraction trailer.

bgs below ground surface
DP discharge point
GMP gas monitoring probe
NA not applicable
PV passive vent
UCSF University of California, San Francisco

Data from additional (landfill cap) monitoring locations are shown in Appendix B

## TABLE 4: NMOC CONCENTRATIONS, MAY 22, 2006

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Location | Monitoring Location ID Number | Screened Interval (feet bgs) | Depth to Water (feet bgs) | NMOC Concentration on May 22, 2006 (parts per million) |
|---|---|---|---|---|
| Fence Line GMPs | GMP01A | 6.0 to 13.5 | NA | 0.1 |
| | GMP02A | 6.0 to 13.5 | NA | 0.1 |
| | GMP03 | 6.0 to 13.5 | NA | 0.1 |
| | GMP04A | 6.0 to 13.5 | NA | 0.1 |
| | GMP05B | 6.0 to 12.5 | NA | 0.1 |
| | GMP06B | 6.0 to 13.5 | NA | 0.1 |
| | GMP07A | 6.0 to 13.5 | NA | 0.1 |
| | GMP08A | 4.5 to 9.5 | NA | 0.1 |
| | GMP09 | 6.0 to 9.5 | NA | 0.1 |
| | GMP10 | 4.0 to 6.5 | NA | 0.1 |
| | GMP11A | 4.0 to 5.5 | NA | 0.1 |
| | GMP12 | 5.0 to 13.0 | NA | 0.1 |
| | GMP20 | 3.5 to 4.5 | NA | 0.1 |
| | GMP21 | 3.5 to 4.5 | NA | 0.1 |
| UCSF Compound GMPs | GMP22 | 6.0 to 13.5 | NA | 0.1 |
| | GMP23 | 6.0 to 13.5 | NA | 4.1 |
| | GMP24 | 6.0 to 13.0 | NA | 6.2 |
| | GMP25 | 6.5 to 11.5 | NA | 0.1 |
| | GMP26 | 6.5 to 11.5 | NA | 0.1 |
| Crisp Avenue GMPs | GMP13 | 6.0 to 12.0 | NA | 0.1 |
| | GMP14 | 6.0 to 10.0 | NA | 0.1 |
| | GMP15 | 6.0 to 12.0 | NA | 0.1 |
| | GMP16 | 5.0 to 10.0 | NA | 0.1 |
| | GMP17 | 6.0 to 10.0 | NA | 0.1 |
| | GMP18 | 6.0 to 12.0 | NA | 0.1 |
| | GMP19 | 4.5 to 5.5 | NA | 0.1 |
| | GMP27 | 4.7 to 22.2 | 9.48 | 0.1 |
| | GMP28 | 6.2 to 21.2 | 14.37 | 0.1 |
| | GMP29 | 6.2 to 18.7 | 12.53 | 0.1 |
| | GMP30 | 4.5 to 17.0 | 11.28 | 0.1 |
| | GMP31 | 6.0 to 16.0 | 11.15 | 0.1 |
| | GMP32 | 4.75 to 14.75 | 10.74 | 0.1 |

## TABLE 4: NMOC CONCENTRATIONS, MAY 22, 2006 (continued)

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Location | Monitoring Location ID Number | Screened Interval (feet bgs) | Depth to Water (feet bgs) | NMOC Concentration on May 22, 2006 (parts per million) |
|---|---|---|---|---|
| Ambient Air Locations | Light Pole | NA | NA | 0.1 |
| | Ground Surface Along Fence | NA | NA | 0.1 |
| | Basketball Court | NA | NA | 0.1 |
| Occupied Structure | Building 830 Crawlspace | NA | NA | 0.1 |
| On-Site Utilities [a] | DP1 | NA | NA | 0.1 |
| | DP2 | NA | NA | 0.1 |
| Passive Vents [b] | PV-01 Influent | NA | NA | 7.4 |
| | PV-01 Carbon 1 | NA | NA | 4.8 |
| | PV-01 Hydrosil | NA | NA | 0.1 |
| | PV-02 Influent | NA | NA | 0.5 |
| | PV-02 Carbon 1 * | NA | NA | 13.2 |
| | PV-02 Hydrosil * | NA | NA | 0.1 |
| | PV-03 Influent | NA | NA | 0.1 |
| | PV-03 Carbon 1 | NA | NA | 0.1 |
| | PV-03 Hydrosil | NA | NA | 0.1 |
| | PV-04 Influent | NA | NA | 0.1 |
| | PV-04 Carbon 1 | NA | NA | 0.1 |
| | PV-04 Hydrosil | NA | NA | 0.1 |
| | PV-05 Influent | NA | NA | 1.9 |
| | PV-05 Carbon 1 | NA | NA | 1.5 |
| | PV-05 Hydrosil | NA | NA | 0.1 |

**Notes:**

[a] EW108, EW122, EV122, EW134, EV134, EW138, EV138, EW142, EV142, EW146, EV146, EW150, EV150, EW154, EW158, and EV158 were excavated and removed between September 2005 and January 2006, and are no longer monitored.

[b] The regulatory limit of 5% methane does not apply to passive vents, which are part of the remedial system designed to collect and control migration of landfill gas.

* PV-02 Carbon 1 and Hydrosil drums located on active extraction trailer.

bgs below ground surface
DP discharge point
GMP gas monitoring probe
NA not applicable
ppm parts per million
PV passive vent
UCSF University of California, San Francisco

Data from additional (landfill cap) monitoring locations are shown in Appendix B

## TABLE 5: OXYGEN CONCENTRATIONS, MAY 22, 2006

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Location | Monitoring Location ID Number | Screened Interval (feet bgs) | Depth to Water (feet bgs) | Oxygen Concentration on May 22, 2006 (percent by volume) |
|---|---|---|---|---|
| Fence Line GMPs | GMP01A | 6.0 to 13.5 | NA | 8.3 |
| | GMP02A | 6.0 to 13.5 | NA | 6.8 |
| | GMP03 | 6.0 to 13.5 | NA | 10.2 |
| | GMP04A | 6.0 to 13.5 | NA | 16.4 |
| | GMP05B | 6.0 to 12.5 | NA | 11.1 |
| | GMP06B | 6.0 to 13.5 | NA | 17.8 |
| | GMP07A | 6.0 to 13.5 | NA | 16.0 |
| | GMP08A | 4.5 to 9.5 | NA | 0.3 |
| | GMP09 | 6.0 to 9.5 | NA | 17.4 |
| | GMP10 | 4.0 to 6.5 | NA | 20.8 |
| | GMP11A | 4.0 to 5.5 | NA | 13.1 |
| | GMP12 | 5.0 to 13.0 | NA | 9.7 |
| | GMP20 | 3.5 to 4.5 | NA | 21.0 |
| | GMP21 | 3.5 to 4.5 | NA | 21.3 |
| UCSF Compound GMPs | GMP22 | 6.0 to 13.5 | NA | 2.0 |
| | GMP23 | 6.0 to 13.5 | NA | 0.3 |
| | GMP24 | 6.0 to 13.0 | NA | 0.4 |
| | GMP25 | 6.5 to 11.5 | NA | 0.2 |
| | GMP26 | 6.5 to 11.5 | NA | 17.4 |
| Crisp Avenue GMPs | GMP13 | 6.0 to 12.0 | NA | 16.7 |
| | GMP14 | 6.0 to 10.0 | NA | 20.6 |
| | GMP15 | 6.0 to 12.0 | NA | 17.1 |
| | GMP16 | 5.0 to 10.0 | NA | 20.0 |
| | GMP17 | 6.0 to 10.0 | NA | 19.8 |
| | GMP18 | 6.0 to 12.0 | NA | 19.5 |
| | GMP19 | 4.5 to 5.5 | NA | 20.4 |
| | GMP27 | 4.7 to 22.2 | 9.48 | 18.6 |
| | GMP28 | 6.2 to 21.2 | 14.37 | 16.8 |
| | GMP29 | 6.2 to 18.7 | 12.53 | 19.3 |
| | GMP30 | 4.5 to 17.0 | 11.28 | 19.6 |
| | GMP31 | 6.0 to 16.0 | 11.15 | 20.2 |
| | GMP32 | 4.75 to 14.75 | 10.74 | 20.4 |

## TABLE 5: OXYGEN CONCENTRATIONS, MAY 22, 2006 (continued)

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Location | Monitoring Location ID Number | Screened Interval (feet bgs) | Depth to Water (feet bgs) | Oxygen Concentration on May 22, 2006 (percent by volume) |
|---|---|---|---|---|
| Ambient Air Locations | Light Pole | NA | NA | 21.0 |
| | Ground Surface Along Fence | NA | NA | 21.0 |
| | Basketball Court | NA | NA | 20.9 |
| Occupied Structure | Building 830 Crawlspace | NA | NA | 20.9 |
| On-Site Utilities [a] | DP1 | NA | NA | 20.9 |
| | DP2 | NA | NA | 21.0 |
| Passive Vents [b] | PV-01 Influent | NA | NA | 7.0 |
| | PV-01 Carbon 1 | NA | NA | 6.0 |
| | PV-01 Hydrosil | NA | NA | 20.9 |
| | PV-02 Influent | NA | NA | 16.8 |
| | PV-02 Carbon 1 * | NA | NA | 20.5 |
| | PV-02 Hydrosil * | NA | NA | 20.5 |
| | PV-03 Influent | NA | NA | 19.2 |
| | PV-03 Carbon 1 | NA | NA | 19.1 |
| | PV-03 Hydrosil | NA | NA | 20.9 |
| | PV-04 Influent | NA | NA | 13.1 |
| | PV-04 Carbon 1 | NA | NA | 9.6 |
| | PV-04 Hydrosil | NA | NA | 5.2 |
| | PV-05 Influent | NA | NA | 1.3 |
| | PV-05 Carbon 1 | NA | NA | 1.5 |
| | PV-05 Hydrosil | NA | NA | 20.5 |

**Notes:**

[a] EW108, EW122, EV122, EW134, EV134, EW138, EV138, EW142, EV142, EW146, EV146, EW150, EV150, EW154, EW158, and EV158 were excavated and removed between September 2005 and January 2006, and are no longer monitored.

[b] The regulatory limit of 5% methane does not apply to passive vents, which are part of the remedial system designed to collect and control migration of landfill gas.

* PV-02 Carbon 1 and Hydrosil drums located on active extraction trailer.

bgs below ground surface
DP discharge point
GMP gas monitoring probe
NA not applicable
PV passive vent
UCSF University of California, San Francisco

Data from additional (landfill cap) monitoring locations are shown in Appendix B

## TABLE 6: CARBON DIOXIDE CONCENTRATIONS, MAY 22, 2006

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Location | Monitoring Location ID Number | Screened Interval (feet bgs) | Depth to Water (feet bgs) | Carbon Dioxide Concentration on May 22, 2006 (percent by volume) |
|---|---|---|---|---|
| Fence Line GMPs | GMP01A | 6.0 to 13.5 | NA | 6.8 |
| | GMP02A | 6.0 to 13.5 | NA | 7.9 |
| | GMP03 | 6.0 to 13.5 | NA | 5.8 |
| | GMP04A | 6.0 to 13.5 | NA | 2.5 |
| | GMP05B | 6.0 to 12.5 | NA | 3.2 |
| | GMP06B | 6.0 to 13.5 | NA | 2.5 |
| | GMP07A | 6.0 to 13.5 | NA | 1.9 |
| | GMP08A | 4.5 to 9.5 | NA | 2.7 |
| | GMP09 | 6.0 to 9.5 | NA | 2.1 |
| | GMP10 | 4.0 to 6.5 | NA | 0.0 |
| | GMP11A | 4.0 to 5.5 | NA | 7.5 |
| | GMP12 | 5.0 to 13.0 | NA | 6.9 |
| | GMP20 | 3.5 to 4.5 | NA | 0.8 |
| | GMP21 | 3.5 to 4.5 | NA | 0.0 |
| UCSF Compound GMPs | GMP22 | 6.0 to 13.5 | NA | 11.2 |
| | GMP23 | 6.0 to 13.5 | NA | 15.2 |
| | GMP24 | 6.0 to 13.0 | NA | 15.0 |
| | GMP25 | 6.5 to 11.5 | NA | 9.3 |
| | GMP26 | 6.5 to 11.5 | NA | 2.1 |
| Crisp Avenue GMPs | GMP13 | 6.0 to 12.0 | NA | 1.2 |
| | GMP14 | 6.0 to 10.0 | NA | 0.3 |
| | GMP15 | 6.0 to 12.0 | NA | 1.4 |
| | GMP16 | 5.0 to 10.0 | NA | 0.1 |
| | GMP17 | 6.0 to 10.0 | NA | 0.3 |
| | GMP18 | 6.0 to 12.0 | NA | 0.4 |
| | GMP19 | 4.5 to 5.5 | NA | 0.1 |
| | GMP27 | 4.7 to 22.2 | 9.48 | 0.7 |
| | GMP28 | 6.2 to 21.2 | 14.37 | 1.3 |
| | GMP29 | 6.2 to 18.7 | 12.53 | 0.4 |
| | GMP30 | 4.5 to 17.0 | 11.28 | 0.5 |
| | GMP31 | 6.0 to 16.0 | 11.15 | 0.2 |
| | GMP32 | 4.75 to 14.75 | 10.74 | 0.2 |

## TABLE 6: CARBON DIOXIDE CONCENTRATIONS, MAY 22, 2006 (continued)

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Location | Monitoring Location ID Number | Screened Interval (feet bgs) | Depth to Water (feet bgs) | Carbon Dioxide Concentration on May 22, 2006 (percent by volume) |
|---|---|---|---|---|
| Ambient Air Locations | Light Pole | NA | NA | 0.0 |
| | Ground Surface Along Fence | NA | NA | 0.0 |
| | Basketball Court | NA | NA | 0.0 |
| Occupied Structure | Building 830 Crawlspace | NA | NA | 0.0 |
| On-Site Utilities [a] | DP1 | NA | NA | 0.0 |
| | DP2 | NA | NA | 0.0 |
| Passive Vents [b] | PV-01 Influent | NA | NA | 18.4 |
| | PV-01 Carbon 1 | NA | NA | 23.5 |
| | PV-01 Hydrosil | NA | NA | 0.4 |
| | PV-02 Influent | NA | NA | 3.7 |
| | PV-02 Carbon 1 * | NA | NA | 0.6 |
| | PV-02 Hydrosil * | NA | NA | 0.6 |
| | PV-03 Influent | NA | NA | 2.0 |
| | PV-03 Carbon 1 | NA | NA | 1.4 |
| | PV-03 Hydrosil | NA | NA | 0.3 |
| | PV-04 Influent | NA | NA | 8.2 |
| | PV-04 Carbon 1 | NA | NA | 21.2 |
| | PV-04 Hydrosil | NA | NA | 26.1 |
| | PV-05 Influent | NA | NA | 27.6 |
| | PV-05 Carbon 1 | NA | NA | 27.2 |
| | PV-05 Hydrosil | NA | NA | 2.2 |

**Notes:**

[a] EW108, EW122, EV122, EW134, EV134, EW138, EV138, EW142, EV142, EW146, EV146, EW150, EV150, EW154, EW158, and EV158 were excavated and removed between September 2005 and January 2006, and are no longer monitored.

[b] The regulatory limit of 5% methane does not apply to passive vents, which are part of the remedial system designed to collect and control migration of landfill gas.

* PV-02 Carbon 1 and Hydrosil drums located on active extraction trailer.

bgs below ground surface
DP discharge point
GMP gas monitoring probe
NA not applicable
PV passive vent
UCSF University of California, San Francisco

Data from additional (landfill cap) monitoring locations are shown in Appendix B

## TABLE 7: PROBE PRESSURES AT GMPS, MAY 22, 2006

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Location | Monitoring Location Identification Number | Screened Interval (feet bgs) | Probe Pressure (inches of water) |
|---|---|---|---|
| Fence Line GMPs | GMP01A | 6.0 to 13.5 | 0.0 |
| | GMP02A | 6.0 to 13.5 | 0.0 |
| | GMP03 | 6.0 to 13.5 | 0.0 |
| | GMP04A | 6.0 to 13.5 | 0.0 |
| | GMP05B | 6.0 to 12.5 | 0.0 |
| | GMP06B | 6.0 to 13.5 | 0.0 |
| | GMP07A | 6.0 to 13.5 | 0.0 |
| | GMP08A | 4.5 to 9.5 | 0.0 |
| | GMP09 | 6.0 to 9.5 | 0.0 |
| | GMP10 | 4.0 to 6.5 | 0.0 |
| | GMP11A | 4.0 to 5.5 | 0.0 |
| | GMP12 | 5.0 to 13.0 | 0.0 |
| | GMP20 | 3.5 to 4.5 | 0.0 |
| | GMP21 | 3.5 to 4.5 | 0.0 |
| UCSF Compound GMPs | GMP22 | 6.0 to 13.5 | 0.0 |
| | GMP23 | 6.0 to 13.5 | 0.0 |
| | GMP24 | 6.0 to 13.0 | 0.0 |
| | GMP25 | 6.5 to 11.5 | 0.0 |
| | GMP26 | 6.5 to 11.5 | 0.0 |
| Crisp Avenue GMPs | GMP13 | 6.0 to 12.0 | 0.0 |
| | GMP14 | 6.0 to 10.0 | 0.0 |
| | GMP15 | 6.0 to 12.0 | 0.0 |
| | GMP16 | 5.0 to 10.0 | 0.0 |
| | GMP17 | 6.0 to 10.0 | 0.0 |
| | GMP18 | 6.0 to 12.0 | 0.0 |
| | GMP19 | 4.5 to 5.5 | 0.0 |
| | GMP27 | 4.7 to 22.2 | 0.0 |
| | GMP28 | 6.2 to 21.2 | 0.0 |
| | GMP29 | 6.2 to 18.7 | 0.0 |
| | GMP30 | 4.5 to 17.0 | 0.0 |
| | GMP31 | 6.0 to 16.0 | 0.0 |
| | GMP32 | 4.75 to 14.75 | 0.0 |

**Notes:**
bgs below ground surface
GMP gas monitoring probe
UCSF University of California, San Francisco

## TABLE 8: GROUNDWATER ELEVATIONS, MAY 22, 2006

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Monitoring Location ID Number | Top of Casing Elevation (feet above msl) | Ground Surface Elevation (feet above msl) | Depth to Water (feet btoc) | Depth to Water (feet bgs) | Groundwater Elevation (feet above msl) |
|---|---|---|---|---|---|
| GMP27 | 21.66 | 22.15 | 8.99 | 9.48 | 12.67 |
| GMP28 | 20.17 | 20.71 | 13.83 | 14.37 | 6.34 |
| GMP29 | 18.48 | 18.92 | 12.09 | 12.53 | 6.39 |
| GMP30 | 16.62 | 17.06 | 10.84 | 11.28 | 5.78 |
| GMP31 | 15.34 | 15.78 | 10.71 | 11.15 | 4.63 |
| GMP32 | 14.02 | 14.59 | 10.17 | 10.74 | 3.85 |
| IR01MW02B | 20.61 | 19.16 | 13.59 | 12.14 | 7.02 |
| IR01MW03A | 19.89 | 19.46 | 12.92 | 12.49 | 6.97 |
| IR01MW05A | 22.56 | 20.44 | 16.08 | 13.96 | 6.48 |
| IR01MW10A | 13.75 | 13.93 | 7.92 | 8.10 | 5.83 |
| IR01MW11A | 17.96 | 15.90 | 12.05 | 9.99 | 5.91 |
| IR01MW12A | 18.25 | 16.28 | 11.98 | 10.01 | 6.27 |
| IR01P03AA | 21.86 | 19.70 | 15.32 | 13.16 | 6.54 |
| IR01P03AB | 19.87 | 20.47 | 12.19 | 12.79 | 7.68 |
| IR01P04A | 21.61 | 19.29 | 15.11 | 12.79 | 6.50 |
| IR74MW01A* | 13.16 | 13.88 | NM | NM | NM |
| IR76MW13A | 19.69 | 20.04 | 13.40 | 13.75 | 6.29 |

**Notes:**

* Well IR74MW01A has been damaged and is covered by trench plate, and therefore was not monitored (see Section 2.4).

bgs below ground surface
btoc below top of casing
GMP gas monitoring probe
IR Installation Restoration
msl mean sea level
MW monitoring well
NM not monitored

## TABLE 9: DAILY METEOROLOGICAL DATA, MAY 2006

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Date | Wind Speed (mph) | Wind Direction (degrees) | Standard Deviation of Wind Direction (degrees) | Air Temperature (°F) | Relative Humidity (%) | Daily Precipitation (inches) | Dew Point (°F) | Barometric Pressure (in. mercury) | Cumulative Precipitation (inches)* |
|---|---|---|---|---|---|---|---|---|---|
| 5/1/2006 | 10.27 | 267.2 | 19.45 | 57.52 | 72.65 | 0.00 | 46.43 | 29.91 | 7.58 |
| 5/2/2006 | 10.48 | 265.6 | 17.89 | 56.96 | 74.18 | 0.00 | 46.32 | 29.88 | 7.58 |
| 5/3/2006 | 10.47 | 239.8 | 13.63 | 53.78 | 77.13 | 0.00 | 44.60 | 29.86 | 7.58 |
| 5/4/2006 | 8.77 | 239.1 | 16.70 | 56.23 | 74.50 | 0.00 | 46.08 | 29.94 | 7.58 |
| 5/5/2006 | 9.89 | 258.6 | 15.51 | 53.54 | 81.65 | 0.00 | 45.45 | 30.02 | 7.58 |
| 5/6/2006 | 13.53 | 265.1 | 13.96 | 53.28 | 78.67 | 0.00 | 44.50 | 30.01 | 7.58 |
| 5/7/2006 | 8.59 | 251.3 | 25.44 | 56.12 | 76.26 | 0.00 | 46.26 | 29.99 | 7.58 |
| 5/8/2006 | 11.43 | 261.9 | 15.99 | 56.36 | 74.87 | 0.00 | 46.10 | 29.97 | 7.58 |
| 5/9/2006 | 8.13 | 291.9 | 12.90 | 56.35 | 72.54 | 0.00 | 45.38 | 29.94 | 7.58 |
| 5/10/2006 | 7.83 | 269.5 | 19.87 | 61.26 | 67.84 | 0.00 | 47.69 | 29.93 | 7.58 |
| 5/11/2006 | 10.36 | 283.6 | 13.21 | 56.66 | 75.70 | 0.00 | 46.54 | 29.93 | 7.58 |
| 5/12/2006 | 10.53 | 273.2 | 14.16 | 56.63 | 71.90 | 0.00 | 45.64 | 29.90 | 7.58 |
| 5/13/2006 | 10.34 | 258.7 | 18.17 | 54.55 | 75.27 | 0.00 | 44.80 | 29.97 | 7.58 |
| 5/14/2006 | 5.85 | 243.2 | 28.39 | 65.48 | 58.76 | 0.00 | 47.80 | 29.92 | 7.58 |
| 5/15/2006 | 8.71 | 241.1 | 24.58 | 64.88 | 62.84 | 0.00 | 49.90 | 29.86 | 7.58 |
| 5/16/2006 | 11.30 | 281.4 | 13.79 | 57.19 | 80.00 | 0.00 | 48.17 | 30.00 | 7.58 |
| 5/17/2006 | 12.33 | 271.7 | 13.56 | 53.57 | 89.52 | 0.00 | 47.10 | 29.94 | 7.58 |
| 5/18/2006 | 11.40 | 262.9 | 17.34 | 53.60 | 89.30 | 0.00 | 47.05 | 29.93 | 7.58 |
| 5/19/2006 | 6.16 | 248.8 | 29.77 | 54.29 | 84.50 | 0.08 | 46.66 | 29.95 | 7.66 |
| 5/20/2006 | 5.44 | 174.9 | 26.46 | 59.64 | 80.60 | 0.00 | 50.37 | 29.88 | 7.66 |

## TABLE 9: DAILY METEOROLOGICAL DATA, MAY 2006 (continued)

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Date | Wind Speed (mph) | Wind Direction (degrees) | Standard Deviation of Wind Direction (degrees) | Air Temperature (°F) | Relative Humidity (%) | Daily Precipitation (inches) | Dew Point (°F) | Barometric Pressure (in. mercury) | Cumulative Precipitation (inches)* |
|---|---|---|---|---|---|---|---|---|---|
| 5/21/2006 | 5.60 | 209.9 | 22.41 | 59.77 | 83.09 | 0.17 | 51.20 | 29.72 | 7.83 |
| 5/22/2006 | 8.20 | 213.5 | 19.66 | 59.46 | 71.09 | 0.00 | 47.75 | 29.81 | 7.83 |
| 5/23/2006 | 8.99 | 185.2 | 15.68 | 62.98 | 66.48 | 0.00 | 49.62 | 30.10 | 7.83 |
| 5/24/2006 | 8.78 | 234.5 | 21.57 | 61.85 | 74.62 | 0.00 | 50.80 | 30.17 | 7.83 |
| 5/25/2006 | 16.47 | 284.3 | 10.68 | 57.79 | 74.73 | 0.00 | 47.39 | 30.05 | 7.83 |
| 5/26/2006 | 16.87 | 285.1 | 11.26 | 56.64 | 70.14 | 0.00 | 45.20 | 29.92 | 7.83 |
| 5/27/2006 | 13.24 | 285.8 | 11.15 | 55.82 | 67.70 | 0.00 | 43.81 | 29.94 | 7.83 |
| 5/28/2006 | 10.65 | 255.9 | 19.09 | 56.37 | 71.66 | 0.00 | 45.14 | 30.06 | 7.83 |
| 5/29/2006 | 10.34 | 274.20 | 17.39 | 56.36 | 75.06 | 0.00 | 46.05 | 30.08 | 7.83 |
| 5/30/2006 | 11.75 | 270.92 | 13.92 | 56.78 | 78.91 | 0.00 | 47.50 | 30.07 | 7.83 |
| 5/31/2006 | 12.05 | 278.26 | 12.99 | 56.13 | 88.58 | 0.00 | 49.12 | 30.01 | 7.83 |

**Notes:**

Daily meteorological data are averages of hourly data except for daily precipitation, which is the sum of hourly precipitation data, and cumulative precipitation, which is the season-to-date total at the end of each day.

* Cumulative Precipitation is based on a January–December season.

| | |
|---|---|
| °F | degrees Fahrenheit |
| % | percent |
| in. | inches |
| mph | miles per hour |
| NA | not available |

## TABLE 10: MONTHLY METEOROLOGICAL SUMMARY

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

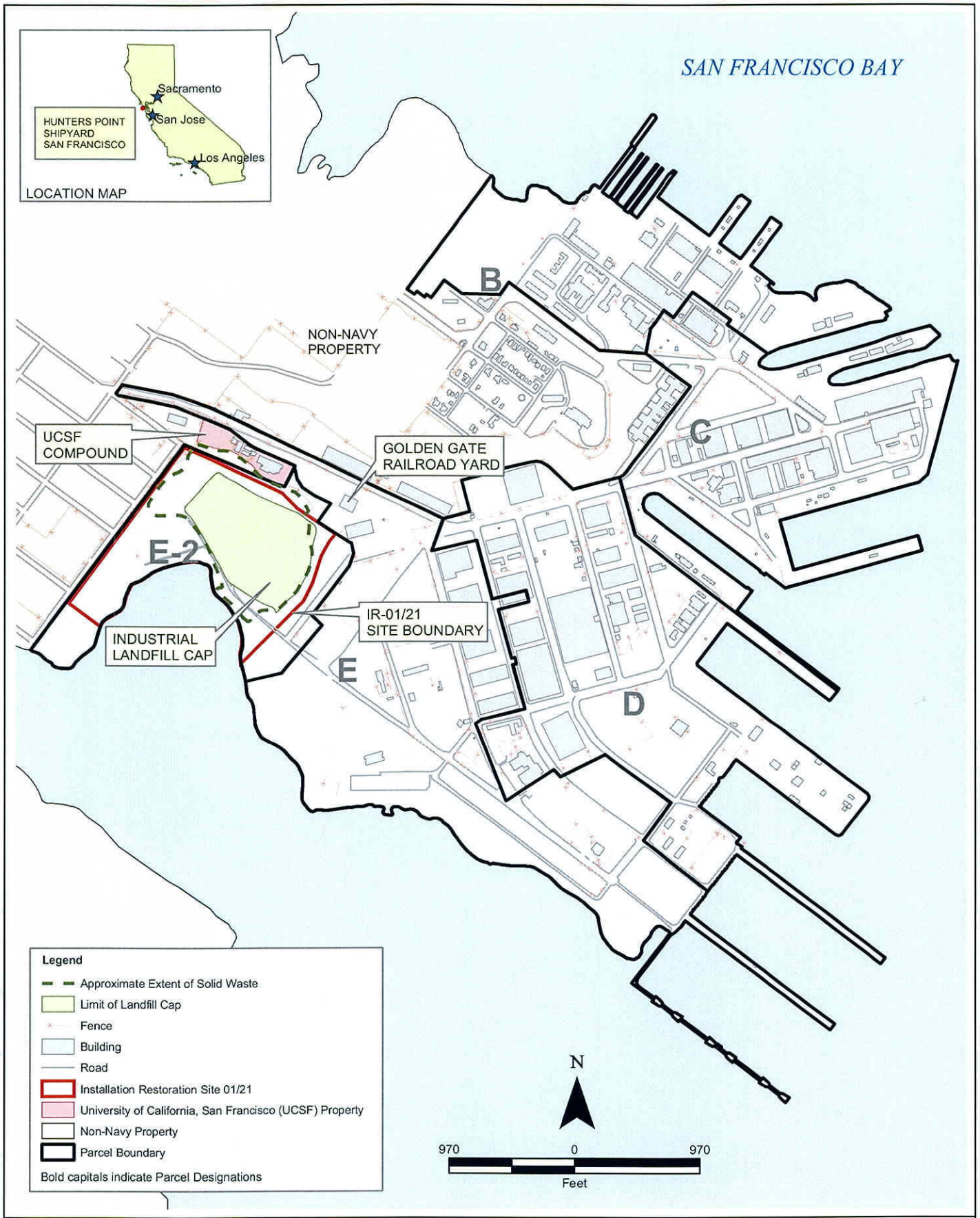
| Date | Wind Speed (mph) | Wind Direction (degrees) | Standard Deviation of Wind Direction (degrees) | Air Temperature (°F) | Relative Humidity (%) | Monthly Precipitation (inches) | Dew Point (°F) | Barometric Pressure (in. mercury) | Cumulative Precipitation (inches)* |
|---|---|---|---|---|---|---|---|---|---|
| April 2005 | 9.48 | 249.49 | 18.08 | 55.06 | 70.23 | 0.88 | 43.71 | 30.02 | 7.64 |
| May 2005 | 10.62 | 265.49 | 14.84 | 58.95 | 76.46 | 0.62 | 48.75 | 29.95 | 8.26 |
| June 2005 | 13.53 | 263.21 | 14.36 | 60.12 | 73.38 | 0.28 | 49.58 | 29.91 | 8.54 |
| July 2005 | 11.74 | 278.68 | 12.12 | 59.97 | 81.19 | 0.00 | 50.75 | 29.89 | 8.54 |
| August 2005 | 10.51 | 276.86 | 13.46 | 58.93 | 82.12 | 0.00 | 49.94 | 29.90 | 8.54 |
| September 2005 | 9.44 | 264.84 | 17.11 | 58.66 | 79.43 | 0.00 | 49.08 | 29.95 | 8.54 |
| October 2005 | 7.83 | 250.26 | 19.11 | 58.38 | 76.84 | 0.09 | 47.99 | 29.98 | 8.63 |
| November 2005 | 5.56 | 212.30 | 30.22 | 56.84 | 72.96 | 0.85 | 45.72 | 30.08 | 9.48 |
| December 2005 | 6.54 | 185.35 | 26.62 | 53.45 | 80.60 | 4.84 | 44.86 | 30.08 | 14.32 |
| January 2006 | 5.62 | 201.70 | 29.65 | 51.80 | 79.07 | 1.32 | 43.06 | 30.14 | 1.32 |
| February 2006 | 6.07 | 204.89 | 28.75 | 52.46 | 74.19 | 1.18 | 42.20 | 30.07 | 2.50 |
| March 2006 | 8.84 | 212.85 | 19.37 | 50.62 | 74.59 | 3.12 | 41.02 | 29.97 | 5.62 |
| April 2006 | 8.35 | 225.90 | 19.56 | 54.56 | 77.77 | 1.96 | 45.27 | 29.95 | 7.58 |
| May 2006 | 10.15 | 255.70 | 17.63 | 57.35 | 75.51 | 0.25 | 46.98 | 29.96 | 7.83 |

**Notes:**
Monthly meteorological data are averages of hourly measurements except for monthly precipitation, which is the sum of hourly precipitation data, and cumulative precipitation, which is the season-to-date total on the last day of each month.

* Cumulative Precipitation is calculated based on a calendar-year (i.e., January–December) season.

°F degrees Fahrenheit
% percent
in. inches
mph miles per hour

# FIGURES

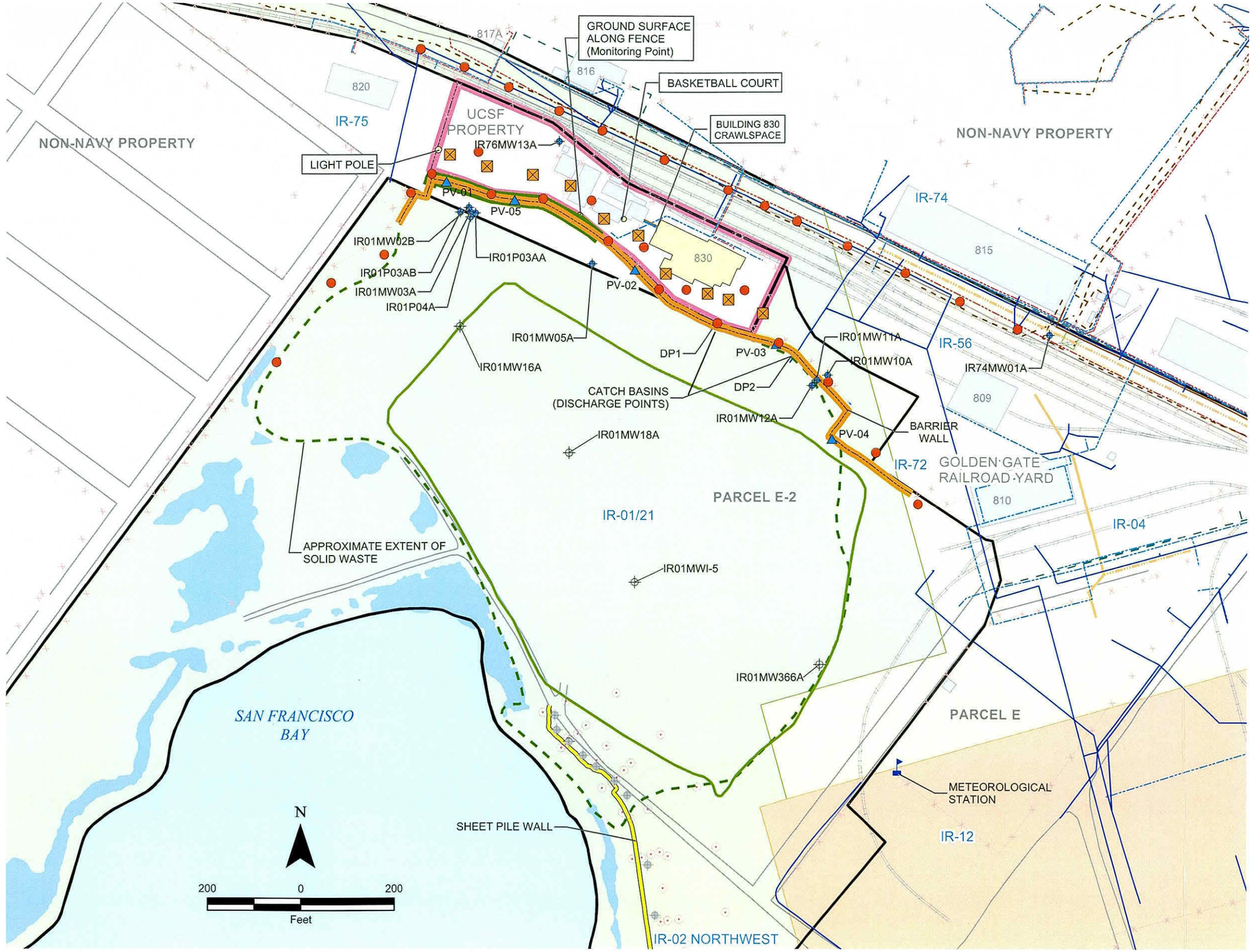



2002/02-125 Navy HPS/CTO-0013 (.15) Parcel E Landfil Gas/Graphics/GIS/ITSI Figures/Site Location Map.mxd

Innovative Technical Solutions, Inc.

**Monthly Landfill Gas Monitoring Report**
Hunters Point Shipyard
San Francisco, California

**FIGURE 1**
Site Location Map

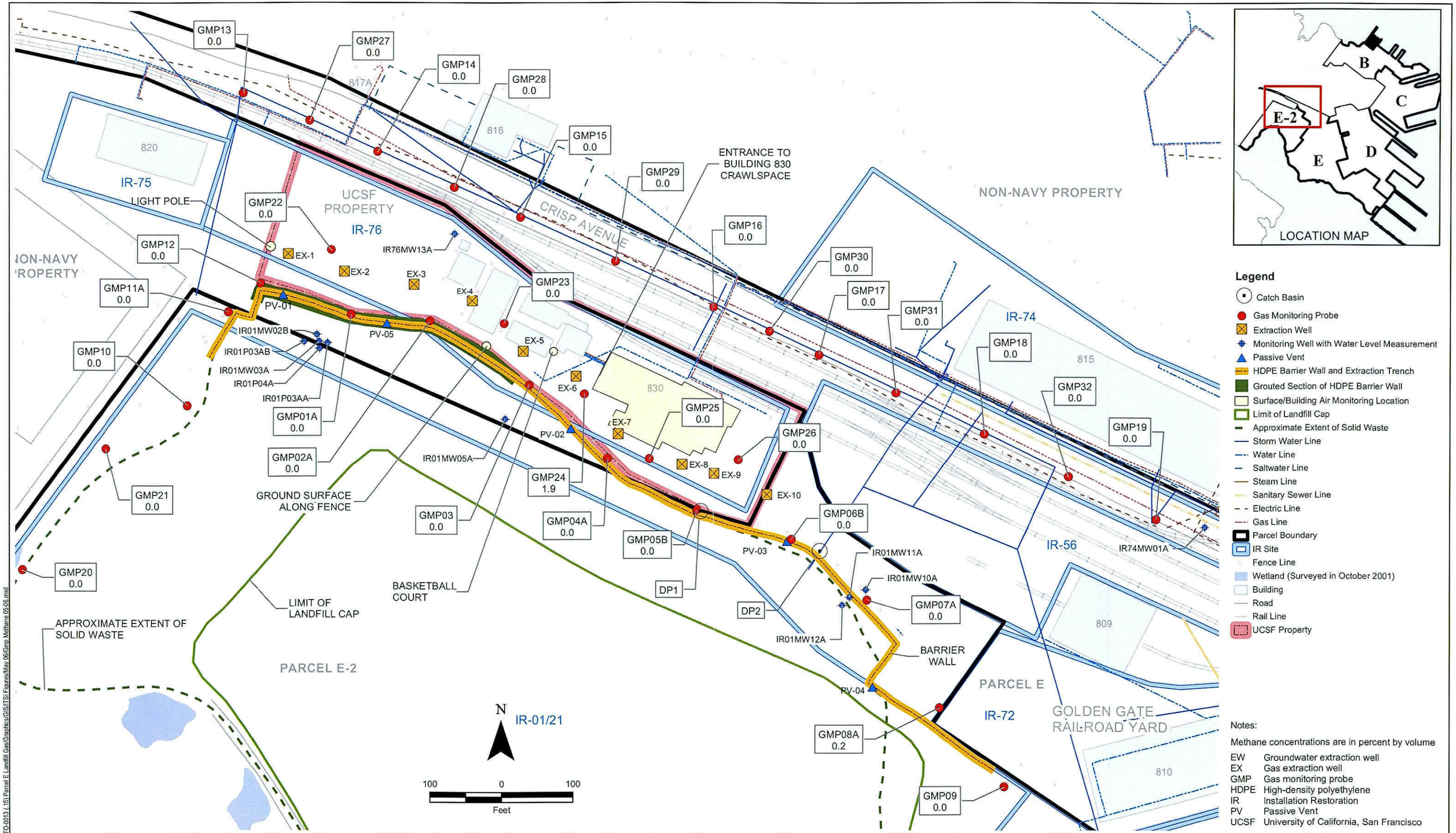



2002/02-125 Navy HPS/CTO-0013 (.15) Parcel E Landfill Gas/Graphics/GIS/ITSI Figures/Landfill Gas.mxd

Innovative Technical Solutions, Inc.

**Monthly Landfill Gas Monitoring Report**
Hunters Point Shipyard
San Francisco, California

**FIGURE 2**
Site Map and
Landfill Gas Monitoring Locations




2002/02-125 Navy HPS/CTO-0013 (.15) Parcel E Landfill Gas/Graphics/GIS/ITSI Figures/May 06/Gmp Methane 05-06.mxd

ITSI Innovative Technical Solutions, Inc.

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Hunters Point Shipyard
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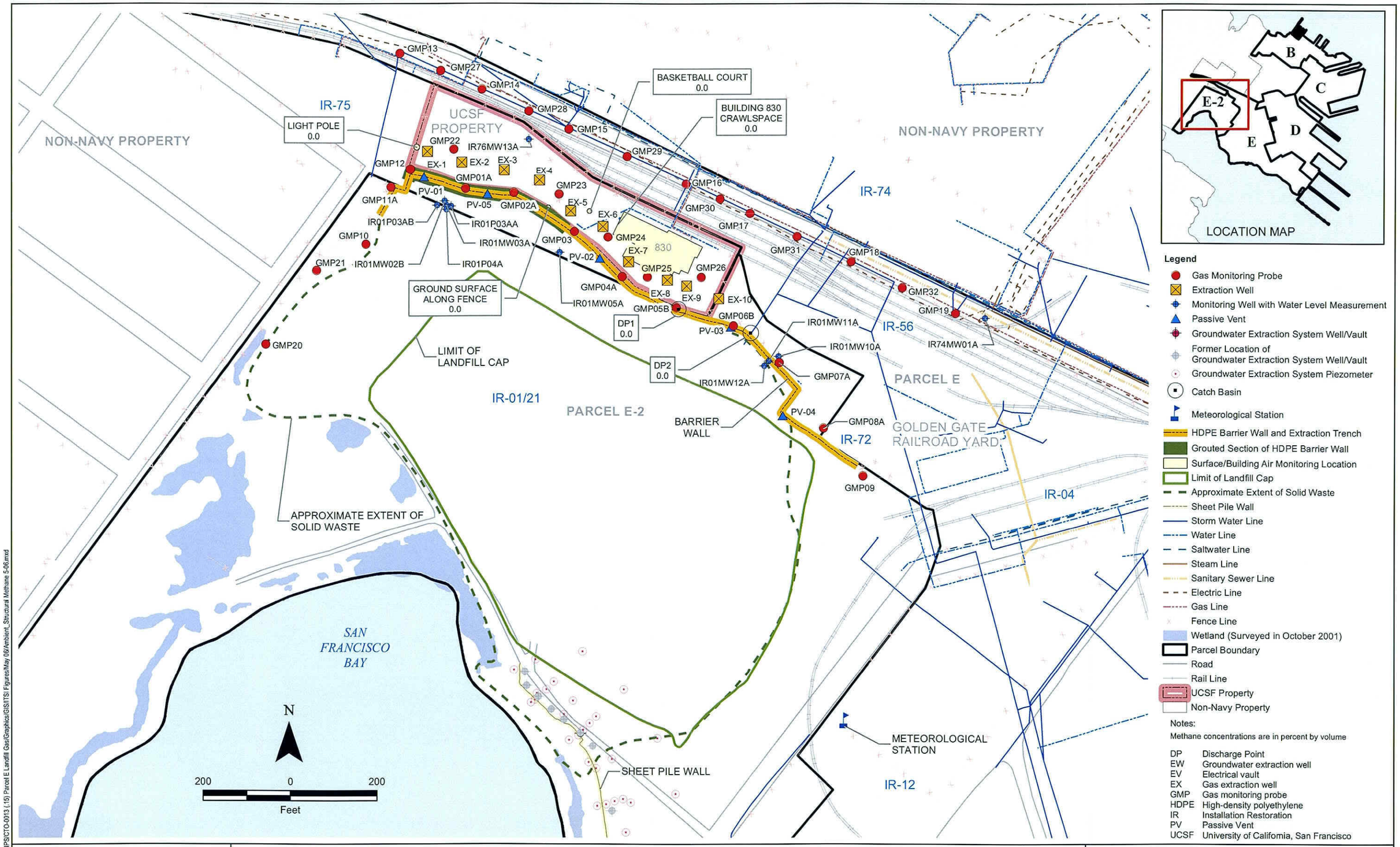
**FIGURE 3**
Methane Concentrations at GMPs
May 22, 2006

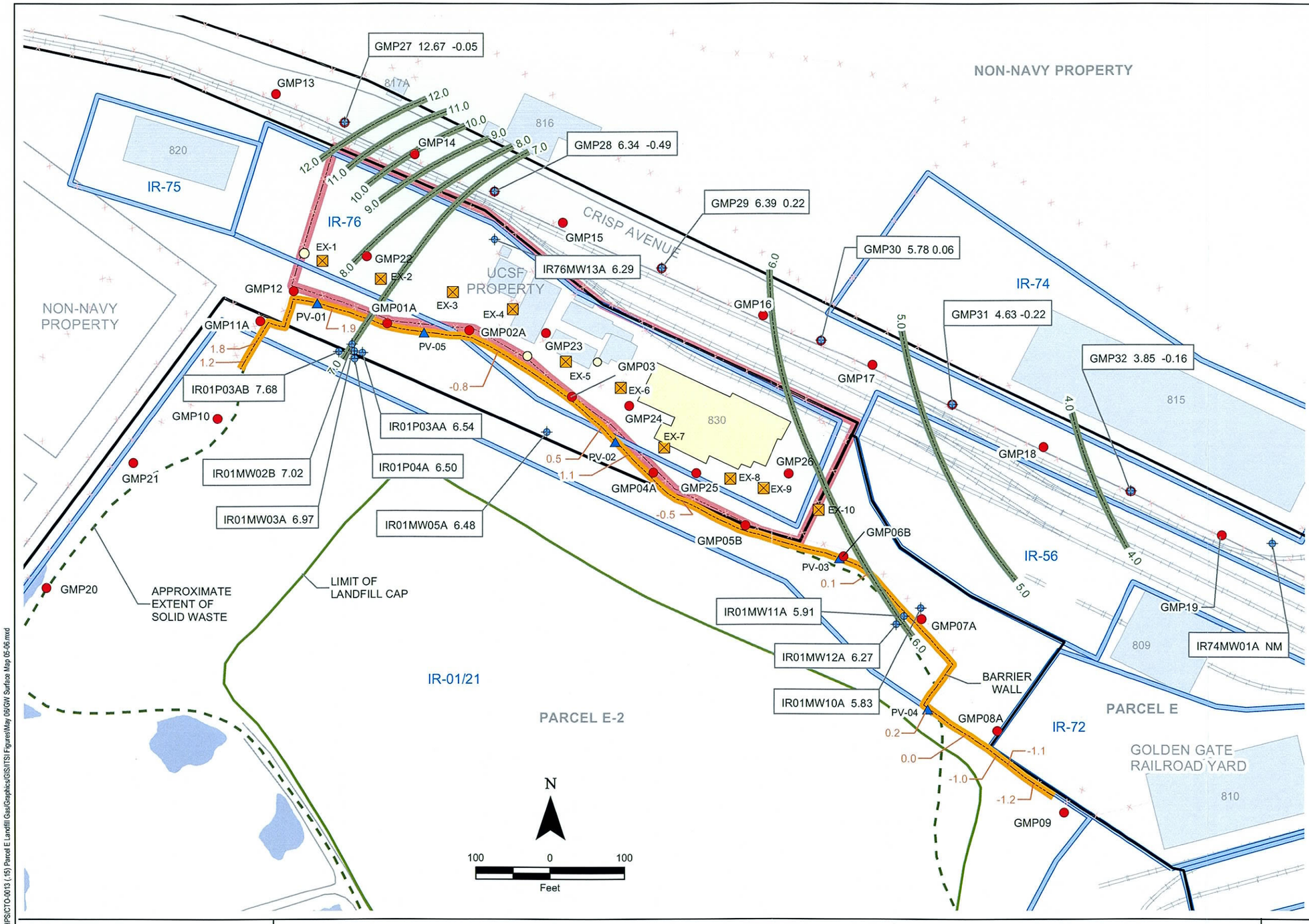



2002/02-125 Navy HPS/CTO-0013 (15) Parcel E Landfill Gas/Graphics/GIS/ITSI Figures/May 06/Ambient_Structural Methane 5-06.mxd

Innovative Technical Solutions, Inc.

**Monthly Landfill Gas Monitoring Report**
Hunters Point Shipyard
San Francisco, California

**FIGURE 4**
Methane Concentrations at Ambient and Structural Locations
May 22, 2006

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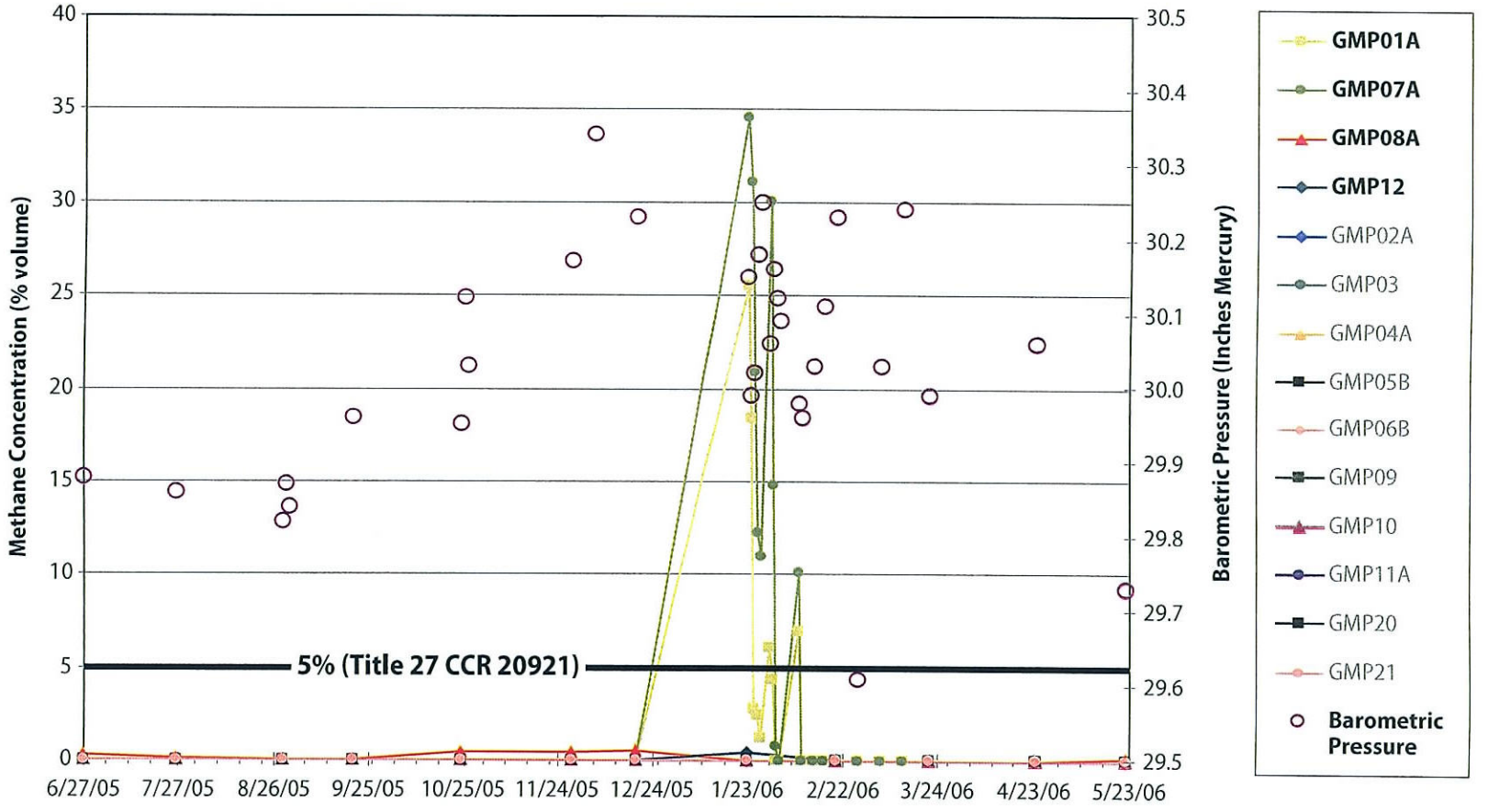
**Monthly Landfill Gas Monitoring Report**
Hunters Point Shipyard
San Francisco, California

**FIGURE 5**
Groundwater Potentiometric Surface Map
May 22, 2006




Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text.
In addition to monthly monitoring results, data shown on this figure reflect followup and precautionary monitoring at GMP01A and GMP07A from January through March 2006.
For each sampling date, the highest methane reading recorded at each sample point is displayed.
GMPs with methane detections during the indicated interval are shown in bold in the legend box.

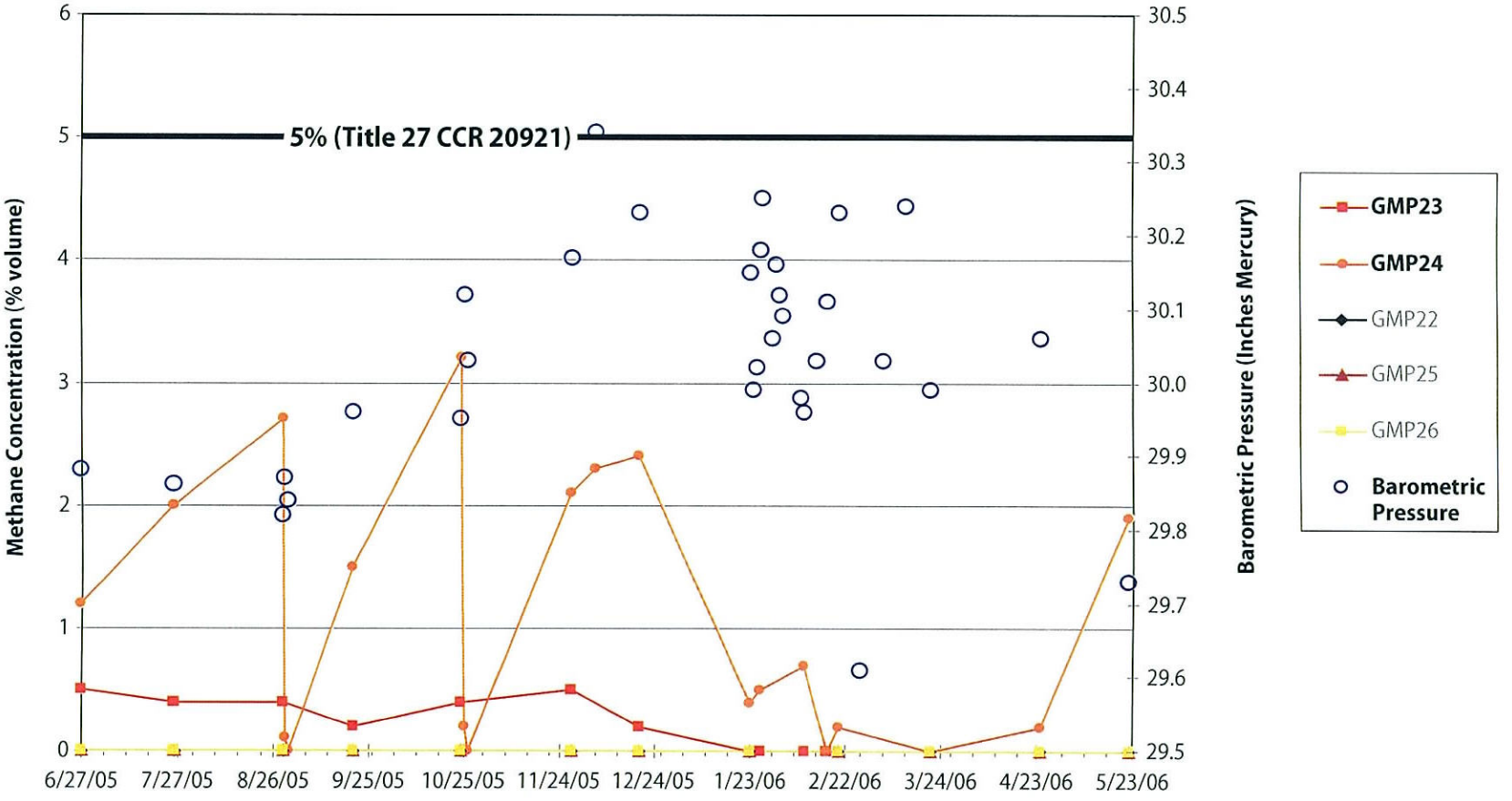
27 CCR Title 27 of the *California Code of Regulations*
GMP Gas monitoring probe

Innovative Technical Solutions, Inc.

**Monthly Landfill Gas Monitoring Report**
Hunters Point Shipyard
San Francisco, California

**FIGURE 6**
Methane Concentrations and Barometric Pressures for GMPs at the Fence Line
June 2005-May 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Apr 06/Excel Chart 6 4-06.ai




Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text.
GMPs with methane detections during the indicated interval are shown in bold in the legend box.
Followup and precautionary monitoring in August 2005, October 2005, and December 2005 was performed only at GMP24.

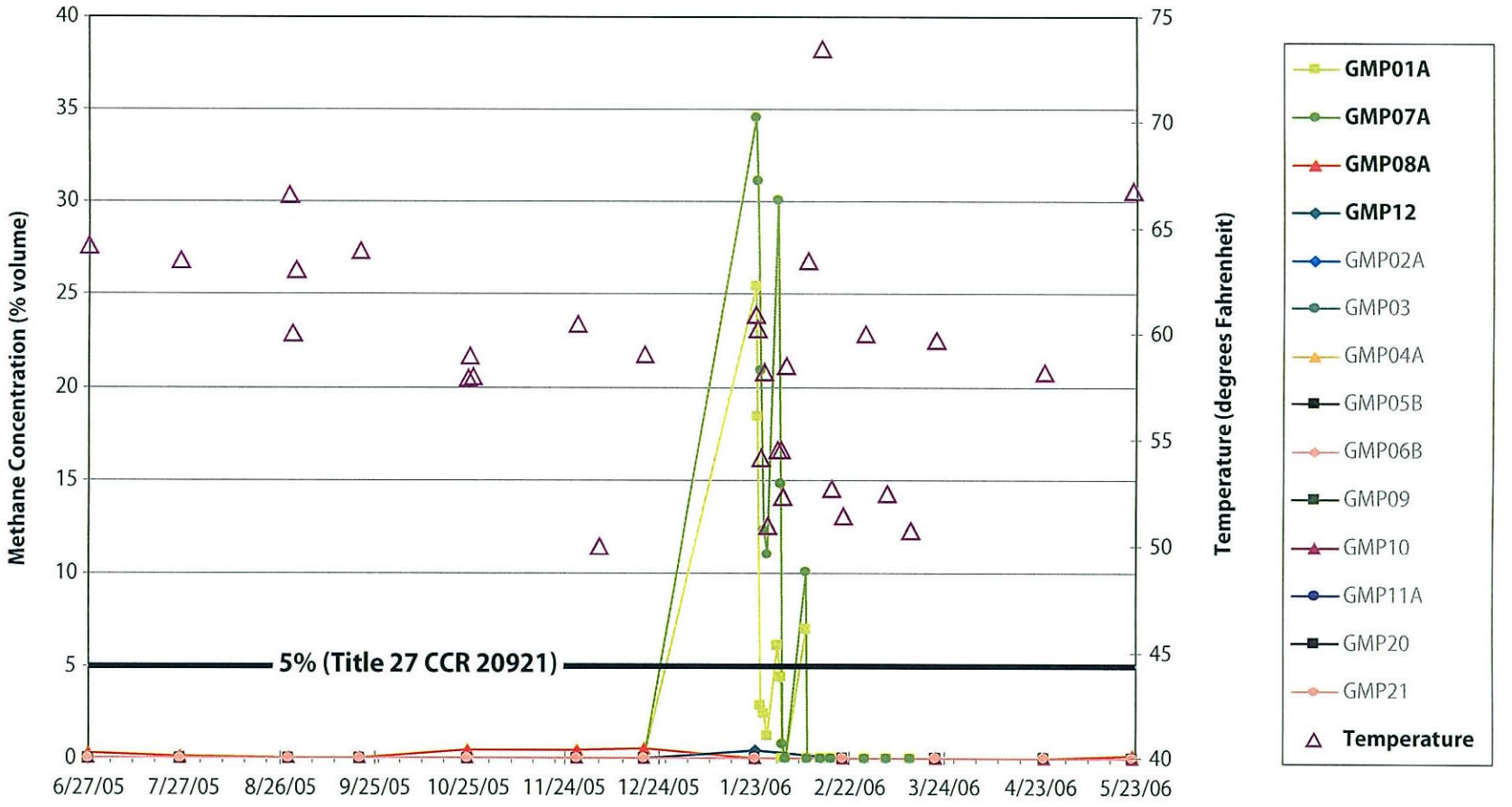
27 CCR Title 27 of the *California Code of Regulations*
GMP Gas monitoring probe
UCSF University of California, San Francisco

Innovative Technical Solutions, Inc.

**Monthly Landfill Gas Monitoring Report**
Hunters Point Shipyard
San Francisco, California

**FIGURE 7**
Methane Concentrations and Barometric Pressures for GMPs at the UCSF Compound
June 2005-May 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Apr 06/Excel Chart 7 4-06.ai




Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text.
In addition to monthly monitoring results, data shown on this figure reflect followup and precautionary monitoring at GMP01A and GMP07A from January through March 2006.
GMPs with methane detections during the indicated interval are shown in bold in the legend box.
For each sampling date, the highest methane reading recorded at each sample point is displayed.

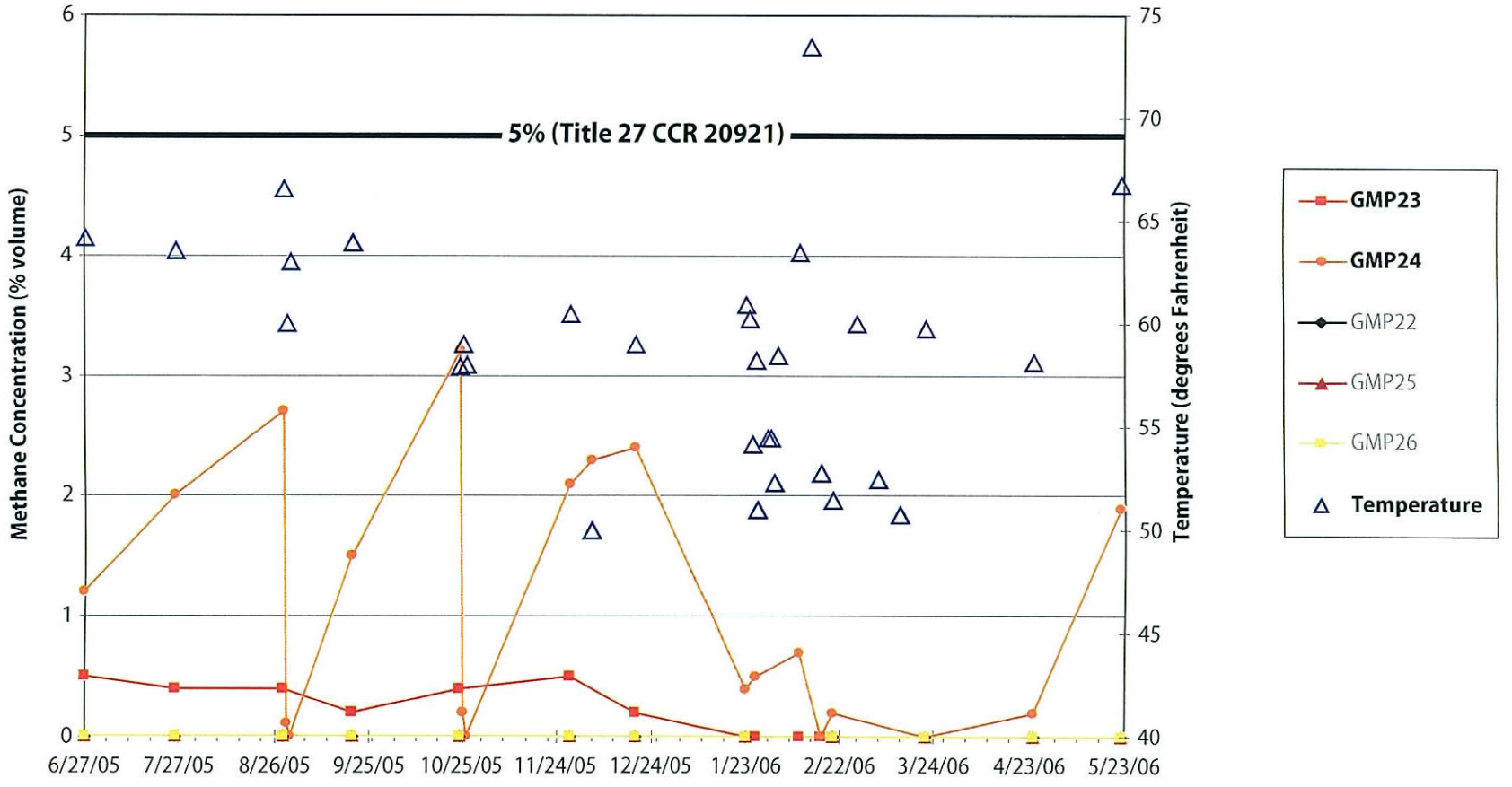
27 CCR Title 27 of the *California Code of Regulations*
GMP Gas monitoring probe

Innovative Technical Solutions, Inc.

**Monthly Landfill Gas Monitoring Report**
Hunters Point Shipyard
San Francisco, California

**FIGURE 8**
Methane Concentrations and Temperatures for GMPs at the Fence Line
June 2005-May 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Apr 06/Excel Chart 8 4-06.ai




Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text.
GMPs with methane detections during the indicated interval are shown in bold in the legend box.
Followup and precautionary monitoring in August 2005, October 2005, and December 2005 was performed only at GMP24.

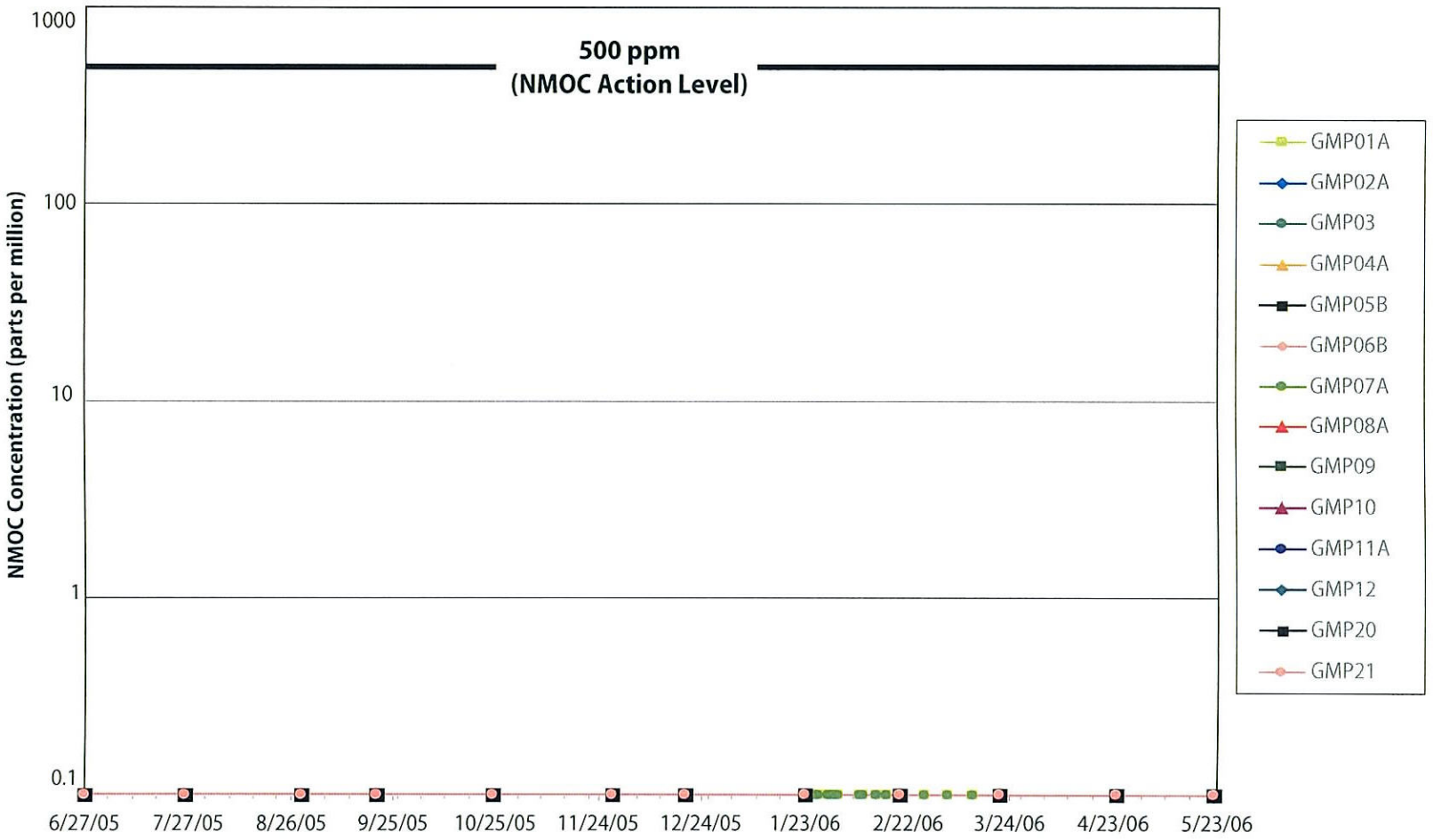
27 CCR Title 27 of the *California Code of Regulations*
GMP Gas monitoring probe
UCSF University of California, San Francisco

Innovative Technical Solutions, Inc.

**Monthly Landfill Gas Monitoring Report**
Hunters Point Shipyard
San Francisco, California

**FIGURE 9**
Methane Concentrations and Temperatures for GMPs at the UCSF Compound
June 2005-May 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Apr 06/Excel Chart 9 4-06.ai




Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text.
In addition to monthly monitoring results, data shown on this figure reflect followup and precautionary monitoring at GMP01A and GMP07A from January through March 2006.
GMPs with NMOC detections during the indicated interval are shown in bold in the legend box.

GMP Gas monitoring probe
NMOC Non-Methane Organic Compound

Innovative Technical Solutions, Inc.

**Monthly Landfill Gas Monitoring Report**
Hunters Point Shipyard
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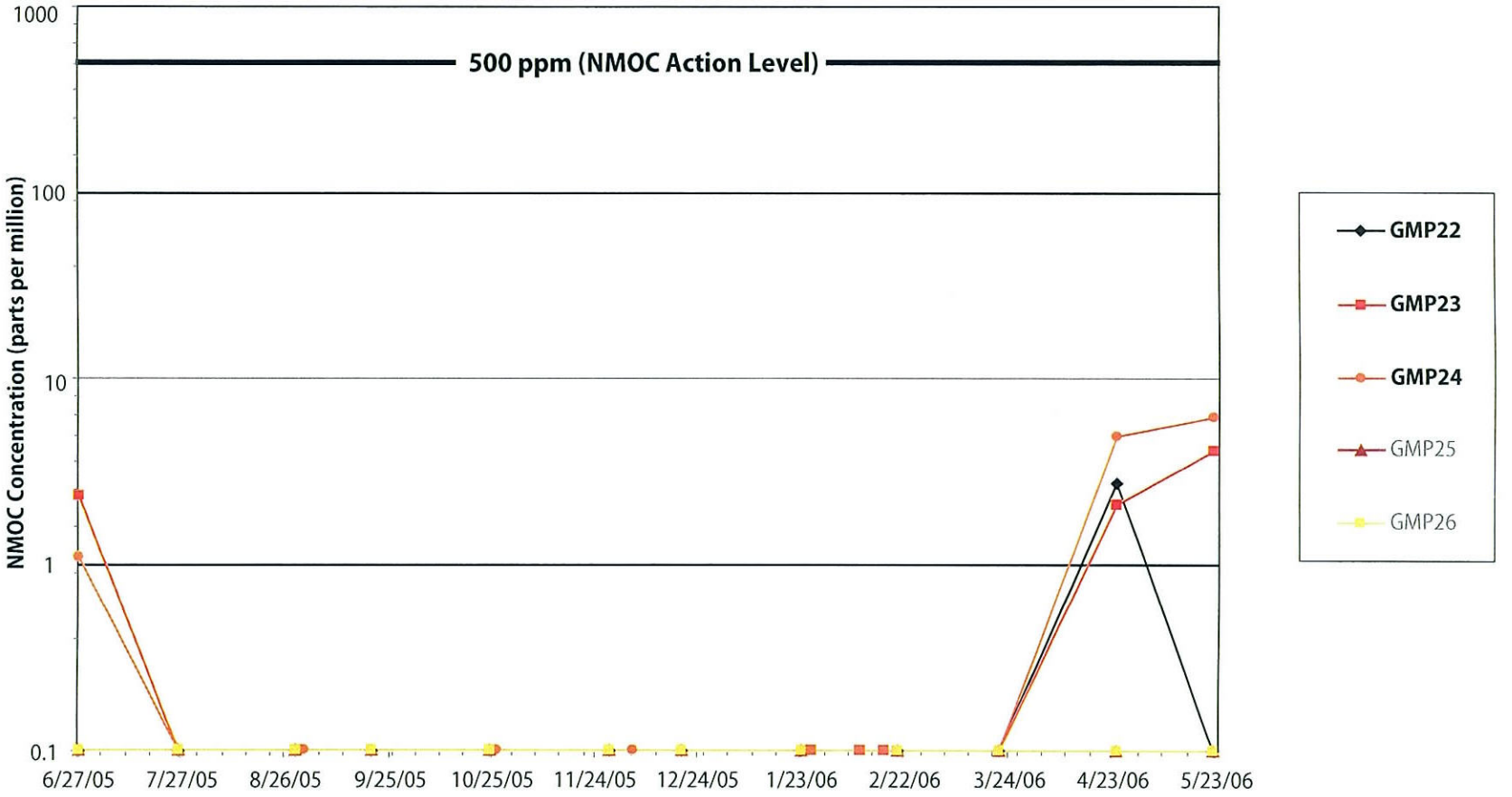
**FIGURE 10**
NMOC Concentrations for GMPs at the Fence Line
June 2005-May 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Apr 06/Excel Chart 10 4-06.ai




Notes: Periods of active gas extraction are specified in Section 2.2.1 of the report text.
GMPs with NMOC detections during the indicated interval are shown in bold in the legend box.
Followup and precautionary monitoring in August 2005, October 2005, and December 2005 was performed only at GMP24.

GMP Gas monitoring probe
NMOC Non-Methane Organic Compound
UCSF University of California, San Francisco

Innovative Technical Solutions, Inc.

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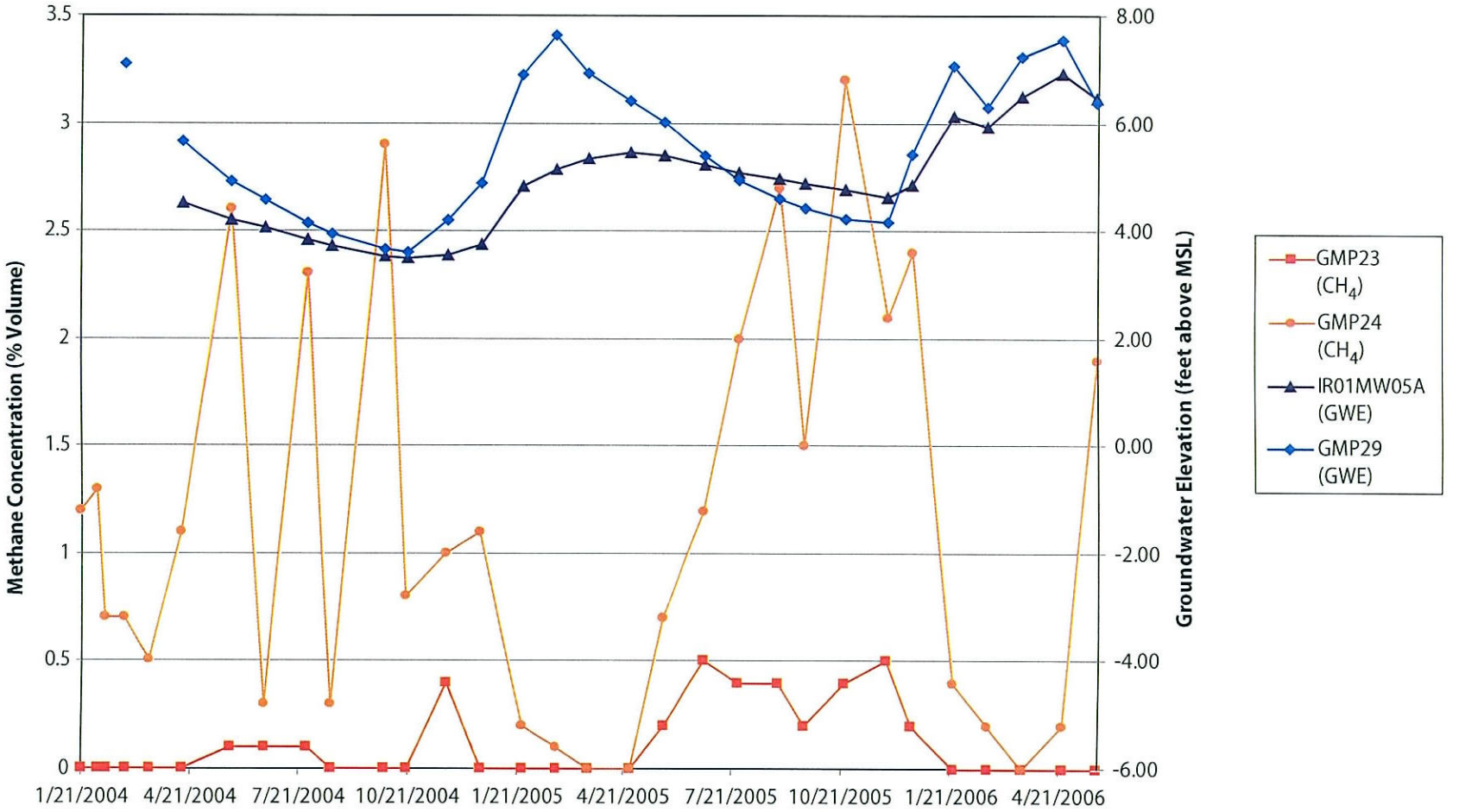
San Francisco, California

**FIGURE 11**
NMOC Concentrations for GMPs
at the UCSF Compound
June 2005-May 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Apr 06/Excel Chart 11 4-06.ai




Notes: Groundwater elevations shown in blue, for two groundwater monitoring locations nearest GMP23 and GMP24.
Methane concentrations shown in shades of red.

$CH_4$ - Methane
GWE - Groundwater elevation, feet above mean sea level
GMP - Gas monitoring probe
IR - Installation restoration

Innovative Technical Solutions, Inc.

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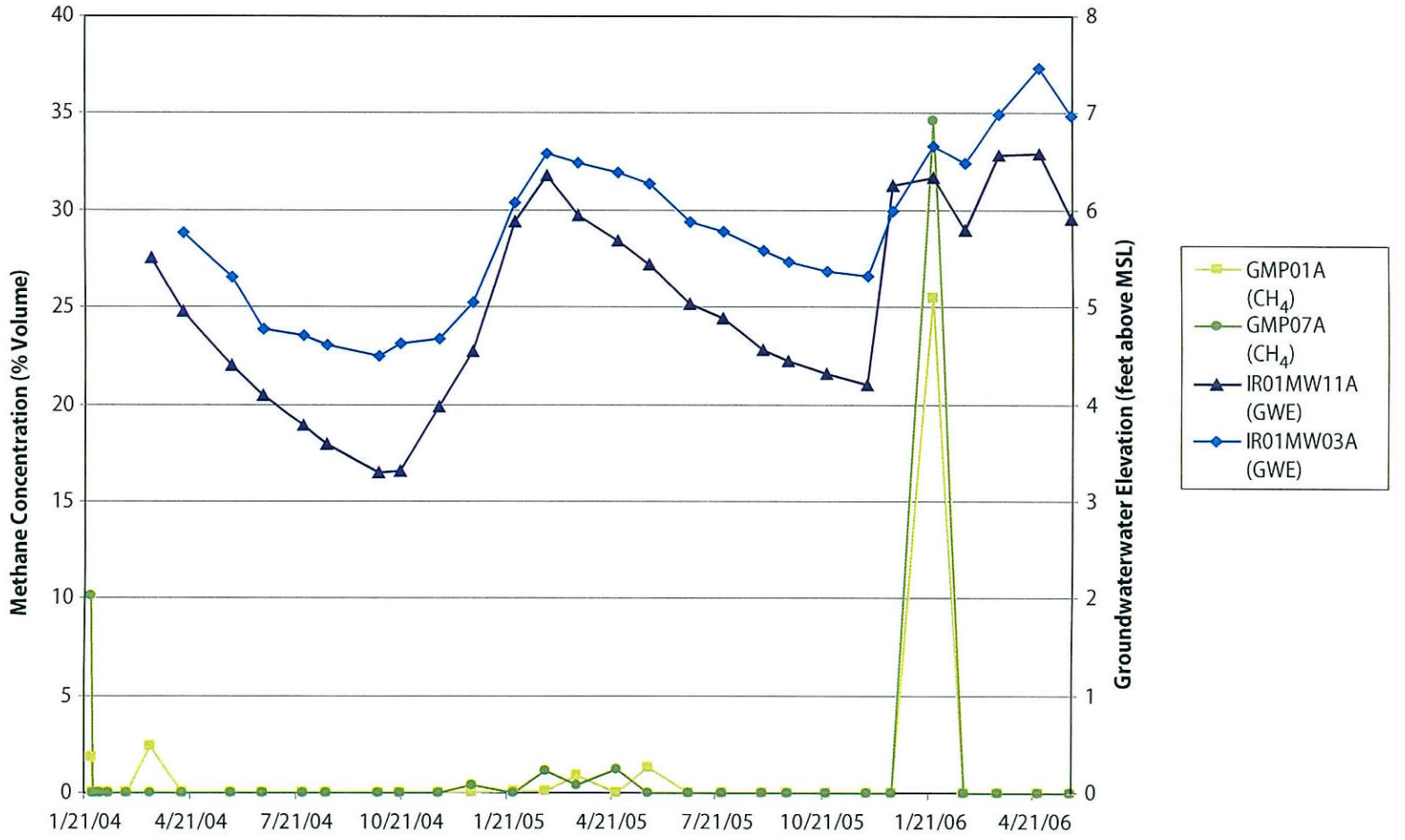
**FIGURE 12**
Methane Concentrations and Groundwater Elevations near GMP23 and GMP24
January 2004-May 2006




Notes: Groundwater elevations shown in blue, for groundwater monitoring location nearest GMP07A.
Methane concentrations shown in shades of green.

$CH_4$ - Methane
GWE - Groundwater elevation, feet above mean sea level
GMP - Gas monitoring probe
IR - Installation restoration

Innovative Technical Solutions, Inc.

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Hunters Point Shipyard
San Francisco, California

**FIGURE 13**
Methane Concentrations and Groundwater Elevations near GMP01A and GMP07A
January 2004-May 2006

2002/02-125 Navy HPS/02-125.15 Parcel E Landfill Gas/Graphics/Monthly Reports/Apr 06/Excel Chart 4-06.ai

## APPENDIX A

## LANDFILL GAS MONITORING LOGS AND WATER-LEVEL MONITORING LOGS

May 22, 2006 (monthly monitoring)

# Landfill Gas Monitoring Log

Weather: Cloudy, warm

Name: B. Womack

| Sampling Location | | | | | GEM-2000 | | | | PID | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location ID | Description (for example, GMP, Well, Carbon, Hydrosil) | Date / Time of Measurement | Temp (°F) | Barometric Pressure (in. Hg) | Methane (%) | $CO_2$ (%) | $O_2$ (%) | Percent of LEL | Non-Methane VOCs (ppm) | Bckgrd. NMOCs (ppm) | Soil Gas Pressure (in. $H_2O$) | Notes (e.g., active extraction location, flow rate, probe damage, instrument issues, etc.) |
| IR01MW366A | Landfill Cap Well | 5/22/06 8:20 | 60 | 29.72 | 9.8 | 4.5 | 15.5 | 196 | 0.1 | 0.1 | 0 | |
| IR01MWI-5 | Landfill Cap Well | 5/22/06 8:40 | 62 | 29.72 | 21.9 | 11.4 | 13.2 | 438 | 0.1 | 0.1 | 0 | |
| IR01MW18A | Landfill Cap Well | 5/22/06 8:47 | 60 | 29.69 | 1.9 | 1.8 | 20.0 | 38 | 0.1 | 0.1 | 0 | |
| IR01MW16A | Landfill Cap Well | 5/22/06 8:57 | 64 | 29.69 | 9.9 | 5.7 | 17.4 | 198 | 0.1 | 0.1 | 0 | |
| GMP-20 | Gas Monitoring Probe | 5/22/06 9:03 | 65 | 29.70 | 0 | 0.8 | 21.0 | 0 | 0.1 | 0.1 | 0 | |
| GMP-21 | Gas Monitoring Probe | 5/22/06 9:08 | 62 | 29.71 | 0 | 0 | 21.3 | 0 | 0.1 | 0.1 | 0 | |
| GMP-10 | Gas Monitoring Probe | 5/22/06 9:27 | 72 | 29.72 | 0 | 0 | 20.8 | 0 | 0.1 | 0.1 | 0 | |
| GMP-11A | Gas Monitoring Probe | 5/22/06 9:30 | 62 | 29.71 | 0 | 7.5 | 13.1 | 0 | 0.1 | 0.1 | 0 | |
| GMP-12 | Gas Monitoring Probe | 5/22/06 9:34 | 60 | 29.69 | 0 | 6.9 | 9.7 | 0 | 0.1 | 0.1 | 0 | |
| PV-01influent | Passive Sys. Influent | 5/22/06 9:37 | 59 | 29.68 | 16.4 | 18.4 | 7.0 | 328 | 7.4 | 0.1 | NA | |
| PV-01carbon1 | Passive Sys. 1st Carbon | 5/22/06 9:43 | 64 | 29.70 | 26.1 | 23.5 | 6.0 | 522 | 4.8 | 0.1 | NA | |
| PV-01hydrosil | Passive Sys. Hydrosil | 5/22/06 9:46 | 65 | 29.68 | 0 | 0.4 | 20.9 | 0 | 0.1 | 0.1 | NA | |
| GMP-01A | Gas Monitoring Probe | 5/22/06 9:52 | 64 | 29.71 | 0 | 6.8 | 8.3 | 0 | 0.1 | 0.1 | 0 | |
| PV-05influent | Passive Sys. Influent | 5/22/06 9:54 | 67 | 29.70 | 47.5 | 27.6 | 1.3 | 950 | 1.9 | 0.1 | NA | |
| PV-05carbon1 | Passive Sys. 1st Carbon | 5/22/06 9:57 | 63 | 29.69 | 47.1 | 27.2 | 1.5 | 942 | 1.5 | 0.1 | NA | |
| PV-05hydrosil | Passive Sys. Hydrosil | 5/22/06 10:01 | 67 | 29.74 | 0.2 | 2.2 | 20.5 | 4 | 0.1 | 0.1 | NA | |
| GMP-02A | Gas Monitoring Probe | 5/22/06 10:05 | 61 | 29.69 | 0 | 7.9 | 6.8 | 0 | 0.1 | 0.1 | 0 | |
| PV-02influent | Active Sys. Influent | 5/22/06 10:09 | 66 | 29.70 | 0.8 | 3.7 | 16.8 | 16 | 0.5 | 0.1 | NA | Active ext. on |
| PV-02carbon1 | Active Sys. 1st Carbon | 5/22/06 10:13 | 63 | 29.69 | 0 | 0.6 | 20.5 | 0 | 13.2 | 0.1 | NA | Ext. trailer port |
| PV-02hydrosil | Active Sys. Hydrosil | 5/22/06 10:15 | 62 | 29.73 | 0 | 0.6 | 20.5 | 0 | 0.1 | 0.1 | NA | Ext. trailer port |
| GMP-04A | Gas Monitoring Probe | 5/22/06 10:21 | 61 | 29.72 | 0 | 2.5 | 16.4 | 0 | 0.1 | 0.1 | 0 | |
| GMP-05B | Gas Monitoring Probe | 5/22/06 10:25 | 63 | 29.72 | 0 | 3.2 | 11.1 | 0 | 0.1 | 0.1 | 0 | |
| DP1 | Drainage Catch Basin | 5/22/06 10:27 | 61 | 29.70 | 0 | 0 | 20.9 | 0 | 0.1 | 0.1 | NA | |

# Landfill Gas Monitoring Log

Weather: Cloudy, warm

Name: B. Womack

| Sampling Location | | Date / Time of Measurement | Temp (°F) | Barometric Pressure (in. Hg) | GEM-2000 | | | | PID | | Soil Gas Pressure (in. $H_2O$) | Notes (e.g., active extraction location, flow rate, probe damage, instrument issues, etc.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location ID | Description (for example, GMP, Well, Carbon, Hydrosil) | | | | Methane (%) | $CO_2$ (%) | $O_2$ (%) | Percent of LEL | Non-Methane VOCs (ppm) | Bckgrd. NMOCs (ppm) | | |
| PV-03influent | Passive Sys. Influent | 5/22/06 10:30 | 60 | 29.70 | 0 | 2.0 | 19.2 | 0 | 0.1 | 0.1 | NA | |
| PV-03carbon1 | Passive Sys. 1st Carbon | 5/22/06 10:33 | 65 | 29.72 | 0 | 1.4 | 19.1 | 0 | 0.1 | 0.1 | NA | |
| PV-03hydrosil | Passive Sys. Hydrosil | 5/22/06 10:34 | 65 | 29.74 | 0 | 0.3 | 20.9 | 0 | 0.1 | 0.1 | NA | |
| GMP-06B | Gas Monitoring Probe | 5/22/06 10:36 | 64 | 29.72 | 0 | 2.5 | 17.8 | 0 | 0.1 | 0.1 | 0 | |
| DP2 | Drainage Catch Basin | 5/22/06 10:38 | 66 | 29.74 | 0 | 0 | 21.0 | 0 | 0.1 | 0.1 | NA | |
| GMP-07A | Gas Monitoring Probe | 5/22/06 10:42 | 61 | 29.71 | 0 | 1.9 | 16.0 | 0 | 0.1 | 0.1 | 0 | |
| PV-04influent | Passive Sys. Influent | 5/22/06 10:45 | 68 | 29.72 | 2.2 | 8.2 | 13.1 | 44 | 0.1 | 0.1 | NA | |
| PV-04carbon1 | Passive Sys. 1st Carbon | 5/22/06 10:47 | 65 | 29.71 | 10.3 | 21.2 | 9.6 | 206 | 0.1 | 0.1 | NA | |
| PV-04hydrosil | Passive Sys. Hydrosil | 5/22/06 10:49 | 65 | 29.69 | 33.2 | 26.1 | 5.2 | 664 | 0.1 | 0.1 | NA | |
| GMP-09 | Gas Monitoring Probe | 5/22/06 11:13 | 66 | 29.72 | 0 | 2.1 | 17.4 | 0 | 0.1 | 0.1 | 0 | |
| GMP-08A | Gas Monitoring Probe | 5/22/06 11:16 | 63 | 29.74 | 0.2 | 2.7 | 0.3 | 4 | 0.1 | 0.1 | 0 | |
| GMP-19 | Gas Monitoring Probe | 5/22/06 13:27 | 70 | 29.81 | 0 | 0.1 | 20.4 | 0 | 0.1 | 0.1 | 0 | |
| GMP-32 | Gas Monitoring Probe | 5/22/06 13:35 | 71 | 29.80 | 0 | 0.2 | 20.4 | 0 | 0.1 | 0.1 | 0 | |
| GMP-18 | Gas Monitoring Probe | 5/22/06 13:43 | 69 | 29.84 | 0 | 0.4 | 19.5 | 0 | 0.1 | 0.1 | 0 | |
| GMP-31 | Gas Monitoring Probe | 5/22/06 13:48 | 79 | 29.78 | 0 | 0.2 | 20.2 | 0 | 0.1 | 0.1 | 0 | |
| GMP-17 | Gas Monitoring Probe | 5/22/06 13:56 | 73 | 29.77 | 0 | 0.3 | 19.8 | 0 | 0.1 | 0.1 | 0 | |
| GMP-30 | Gas Monitoring Probe | 5/22/06 14:02 | 73 | 29.75 | 0 | 0.5 | 19.6 | 0 | 0.1 | 0.1 | 0 | |

# Landfill Gas Monitoring Log

Weather: Cloudy, warm

Name: B. Womack

| Sampling Location | | | | | GEM-2000 | | | | PID | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location ID | Description (for example, GMP, Well, Carbon, Hydrosil) | Date / Time of Measurement | Temp (°F) | Barometric Pressure (in. Hg) | Methane (%) | $CO_2$ (%) | $O_2$ (%) | Percent of LEL | Non-Methane VOCs (ppm) | Bckgrd. NMOCs (ppm) | Soil Gas Pressure (in. $H_20$) | Notes (e.g., active extraction location, flow rate, probe damage, instrument issues, etc.) |
| GMP-16 | Gas Monitoring Probe | 5/22/06 14:15 | 73 | 29.74 | 0 | 0.1 | 20.0 | 0 | 0.1 | 0.1 | 0 | |
| GMP-29 | Gas Monitoring Probe | 5/22/06 14:21 | 73 | 29.73 | 0 | 0.4 | 19.3 | 0 | 0.1 | 0.1 | 0 | |
| GMP-15 | Gas Monitoring Probe | 5/22/06 14:28 | 71 | 29.75 | 0 | 1.4 | 17.1 | 0 | 0.1 | 0.1 | 0 | |
| GMP-28 | Gas Monitoring Probe | 5/22/06 14:33 | 72 | 29.72 | 0 | 1.3 | 16.8 | 0 | 0.1 | 0.1 | 0 | |
| GMP-14 | Gas Monitoring Probe | 5/22/06 14:40 | 76 | 29.75 | 0 | 0.3 | 20.6 | 0 | 0.1 | 0.1 | 0 | |
| GMP-27 | Gas Monitoring Probe | 5/22/06 14:46 | 74 | 29.72 | 0 | 0.7 | 18.6 | 0 | 0.1 | 0.1 | 0 | |
| GMP-13 | Gas Monitoring Probe | 5/22/06 14:53 | 70 | 29.73 | 0 | 1.2 | 16.7 | 0 | 0.1 | 0.1 | 0 | |
| Light pole | UCSF Light Pole Ambient | 5/22/06 15:03 | 70 | 29.74 | 0 | 0 | 21.0 | 0 | 0.1 | 0.1 | NA | |
| GMP-22 | Gas Monitoring Probe | 5/22/06 15:05 | 68 | 29.73 | 0 | 11.2 | 2.0 | 0 | 0.1 | 0.1 | 0 | |
| AmbientA | UCSF Fenceline Ambient | 5/22/06 15:09 | 70 | 29.72 | 0 | 0 | 21.0 | 0 | 0.1 | 0.1 | NA | |
| AmbientB | UCSF Ball Court Ambient | 5/22/06 15:11 | 71 | 29.75 | 0 | 0 | 20.9 | 0 | 0.1 | 0.1 | NA | |
| GMP-23 | Gas Monitoring Probe | 5/22/06 15:13 | 69 | 29.75 | 0 | 15.2 | 0.3 | 0 | 4.1 | 0.1 | 0 | |
| GMP-03 | Gas Monitoring Probe | 5/22/06 15:17 | 73 | 29.75 | 0 | 5.8 | 10.2 | 0 | 0.1 | 0.1 | 0 | |
| 830crawlspace | Bldg. 830 Ambient | 5/22/06 15:20 | 72 | 29.76 | 0 | 0 | 20.9 | 0 | 0.1 | 0.1 | NA | |
| GMP-24 | Gas Monitoring Probe | 5/22/06 15:22 | 69 | 29.73 | 1.9 | 15.0 | 0.4 | 38 | 6.2 | 0.1 | 0 | |
| GMP-25 | Gas Monitoring Probe | 5/22/06 15:26 | 70 | 29.75 | 0 | 9.3 | 0.2 | 0 | 0.1 | 0.1 | 0 | |
| GMP-26 | Gas Monitoring Probe | 5/22/06 15:29 | 70 | 29.75 | 0 | 2.1 | 17.4 | 0 | 0.1 | 0.1 | 0 | |

Legend:

| | |
|---|---|
| % | percent by volume |
| °F | degrees Fahrenheit |
| $CO_2$ | carbon dioxide |
| GEM-2000 | CES-LANDTEC landfill gas meter |
| in. Hg | inches of mercury |
| in. $H_20$ | inches of water |
| LEL | lower explosive limit |
| NA | not applicable |
| NMOC | non-methane organic compound |
| $O_2$ | oxygen |
| PID | photoionization detector |
| ppm | parts per million |
| VOC | volatile organic compound |

# Water Level Monitoring Log

Name: B. Womack

Weather: cloudy, warm

Date: 5/22/06

| Location ID | Description (for example, GMP / Well / Carbon / Hydrosil) | Time | Water Level (feet below top of casing) | Notes (e.g, active extraction location, flow rate, probe damage, instrument issues, etc.): |
|---|---|---|---|---|
| IR01MW02B | Well | 1050 | 13.59 | |
| IR01MW03A | Well | 1051 | 12.92 | |
| IR01P03AA | Well | 1052 | 15.32 | |
| IR01P04A | Well | 1053 | 15.11 | |
| IR01P03AB | Well | 1054 | 12.19 | |
| IR01MW05A | Well | 1057 | 16.08 | |
| IR01MW12A | Well | 1101 | 11.98 | |
| IR01MW11A | Well | 1102 | 12.05 | |
| IR01MW10A | Well | 1115 | 7.92 | |
| IR74MW01A | Well | NA | NA | Well is trench-plated over. |
| GMP-32 | Gas Monitoring Probe | 1337 | 10.17 | |
| GMP-31 | Gas Monitoring Probe | 1350 | 10.71 | |
| GMP-30 | Gas Monitoring Probe | 1404 | 10.84 | |
| GMP-29 | Gas Monitoring Probe | 1417 | 12.09 | |
| GMP-28 | Gas Monitoring Probe | 1435 | 13.83 | |
| GMP-27 | Gas Monitoring Probe | 1447 | 8.99 | |
| IR76MW13A | Well | 1451 | 13.40 | |

## APPENDIX B

## OTHER MONITORING RESULTS

## TABLE B-1: METHANE, NMOC, OXYGEN, AND CARBON DIOXIDE CONCENTRATIONS AT OTHER LOCATIONS, MAY 22, 2006

Monthly Landfill Gas Monitoring Report for May 2006, Post-Removal Action,
Parcel E-2 Industrial Landfill, Hunters Point Shipyard, San Francisco, California

| Location | Methane (% by volume) | NMOC (ppm by volume) | Oxygen (% by volume) | Carbon Dioxide (% by volume) |
|---|---|---|---|---|
| IR01MW16A * | 9.9 | 0.1 | 17.4 | 5.7 |
| IR01MW18A * | 1.9 | 0.1 | 20.0 | 1.8 |
| IR01MW366A * | 9.8 | 0.1 | 15.5 | 4.5 |
| IR01MWI-5 * | 21.9 | 0.1 | 13.2 | 11.4 |

**Notes:**

| | |
|---|---|
| * | The regulatory limit of 5% methane does not apply to these monitoring wells, which are located on the landfill. |
| IR | Installation Restoration |
| MW | Monitoring well |
| NMOC | Non-methane organic compounds |
| ppm | parts per million |
| % | percent |